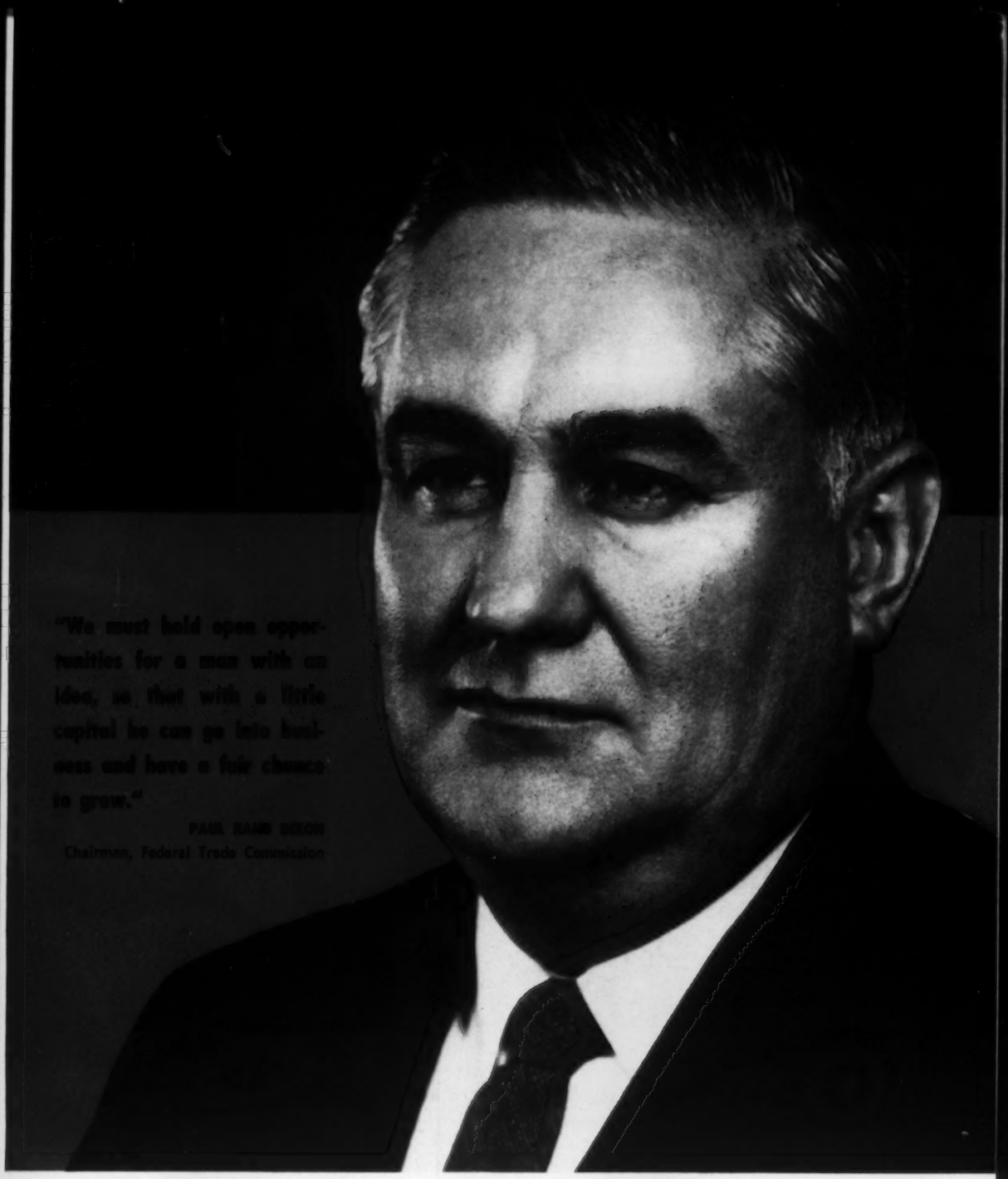
STEEL
The Metalworking Weekly
DECEMBER 4, 1961


"We must hold open opportunities for a man with an idea, so that with a little capital he can go into business and have a fair chance to grow."
PAUL RAND DIXON
Chairman, Federal Trade Commission

In the Kennedy administration—

Screws Turned Tighter on Mergers, Bigness . . 46

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Random Storage Method Saves Space . . 90

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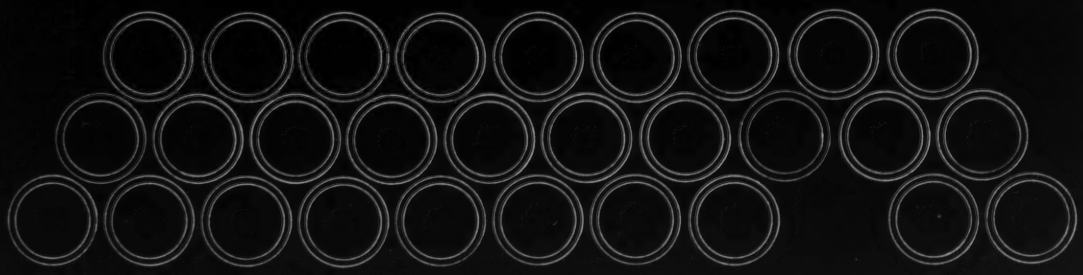
How do you begin to select the proper steel tube?



How do you begin to select the proper steel tube? Consider it for a moment in terms of your application.

First, there's the choice of tube type. Should it be seamless or welded, hot-finished or cold-drawn? Then, what grade of stainless, alloy or carbon steel will best meet your design, production and end-product requirements?

What about surface finish? Should the tube be furnished as rolled, as drawn, scale-free or polished? How should it be heat treated: annealed, tempered or normalized? Is there a size, shape and tolerance that will come closer to your finished product?

When you consider all the variables, there are literally millions of tube combinations available to you. Only one will give you optimum rate of production at lowest possible unit cost—only one is a *Job-Matched* tube. Possibly we can assist you in specifying it.

The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

TA-1008-M

Seamless and welded tubular products, solid extrusions, rolled rings, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Cold-Finishing of Alloy Steels: The Cold-Drawing of Bars

Cold-finishing of alloy bars may be divided into two general categories: (1) cold-drawing, where the bars are pulled through a die with no surface removal; and (2) turning and grinding, and grinding and polishing both of which remove the surface. Only the cold-drawing procedure is discussed here.

Cold-drawing is the process of pulling a pickled-and-limed bar through a die for the purpose of producing a bright, smooth surface finish, and close tolerances. The alloy bars are prepared for cold-drawing by pickling in a hot solution of dilute sulphuric acid for removal of scale. This is followed by a water rinse, and immersion in a hot lime-water bath to neutralize the effects of the acid, as well as to aid in carrying special liquid lubricants into the die.

Alloy bars may be cold-drawn in any of four conditions: *as-rolled*, *normalized*, *annealed* (lamellar or spheroidized), or *quenched and tempered*. These conditions are determined by the grade of alloy steel, the hardness, and the mechanical properties desired for a given end use.

In cold-drawing, the alloy bar is machine-pointed to reduce the size at one end so it will pass easily into the die opening. Otherwise, the bar is pushed or extruded into the die by an auxiliary device. A die-holder, which can be made to contain from one to four dies, is mounted in an appropriate head assembled across a "draw bench," so that from one to four bars can be drawn at the same time. The draw bench has a bed which accommodates a 4-wheel buggy with jaws that grip the pointed ends of the bars as they emerge from the dies. The buggy has a hook on one end which engages an endless chain, thereby pulling the bars entirely through the dies.

After cold-drawing, each bar feeds automatically into a straightening machine, and is sheared or "cracker-cut" to length on appropriate machines. Saws are used when the cross-sections of the bars are too large to be cracked or sheared, or when square ends are required.

Smaller sizes in the form of coils are drawn on "bull-blocks," or "wire-blocks," depending on sizes, followed by straightening and cutting on special machines.

Specifications for chemical composition, grain size, hardenability, and the like, of cold-drawn alloy steels have been given long study by Bethlehem metallurgists. If you would like suggestions on cold-drawn products, or any other problem concerning alloy steels, our metallurgists will be glad to give you all possible help, without cost or obligation on your part.

In addition to manufacturing the entire range of AISI alloy steels, Bethlehem produces special analysis steels and the full range of hot-rolled carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

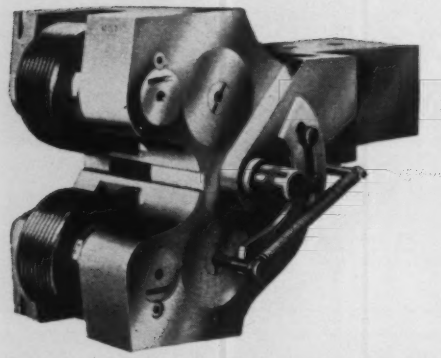
Steel

for Strength
. . . Economy
. . . Versatility

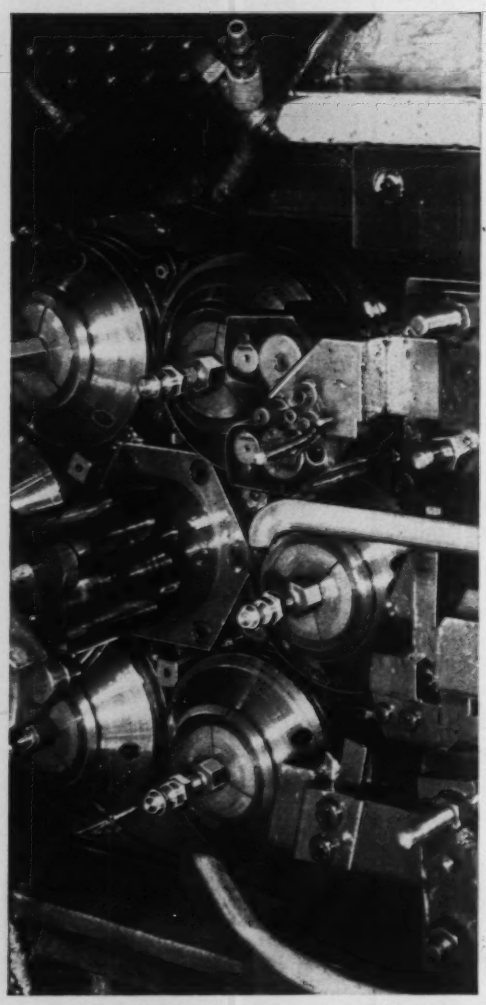
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



thread roll cost only 16½¢ per thousand pieces



The 18GA LANROLL Thread Rolling Attachment again has proved its money-saving value thread rolling clutch shaft parts at AL-KEN Manufacturing Co., Hudson, Michigan.

It is mounted at the fifth position of a 1¼" Six-Spindle Conomatic and rolls ½", 13 pitch, UN, Class 2A, ⅝" long threads on B1113 bar stock. Using only one set of rolls, a direct cost of 16½¢ per thousand was realized in rolling 250,000 pieces.

Besides long roll life, the LANROLL allows rolling of coarse pitch threads to Class 4 tolerances; rolls threads directly to a shoulder with safety and excellent microstructure; produces right-or left-hand, straight or taper threads; has wide range coverage, precise adjustment, attachment tipping to avoid indexing interference, and set-up ease; is designed for bar automatics but can be installed on the cross slide of a lathe providing power feed is used. Ask for Bulletin G-96.

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

608

Ajax Broke the High Temperature Barrier 31 Years Ago

GRAPHITE VAPOR – 3600° C.

The Ajax-Northrup Coreless Induction furnace has allowed industry to extend its temperature possibilities in large controlled chambers far beyond the limits heretofore available. The set-up here shown was used successfully to vaporize graphite at 3600° C., and was maintained at a temperature well above 3000° C. for a period which apparently could be extended indefinitely

January 31, 1930

THIS PENCIL TIPPED WITH A PIECE OF CONDENSED GRAPHITE VAPOR WAS USED TO WRITE THE STATEMENT JUST ABOVE

Induction Heating is our ONLY Business

Magnethermic CORPORATION

GENERAL OFFICES P.O. Box 839 • Youngstown 1, Ohio
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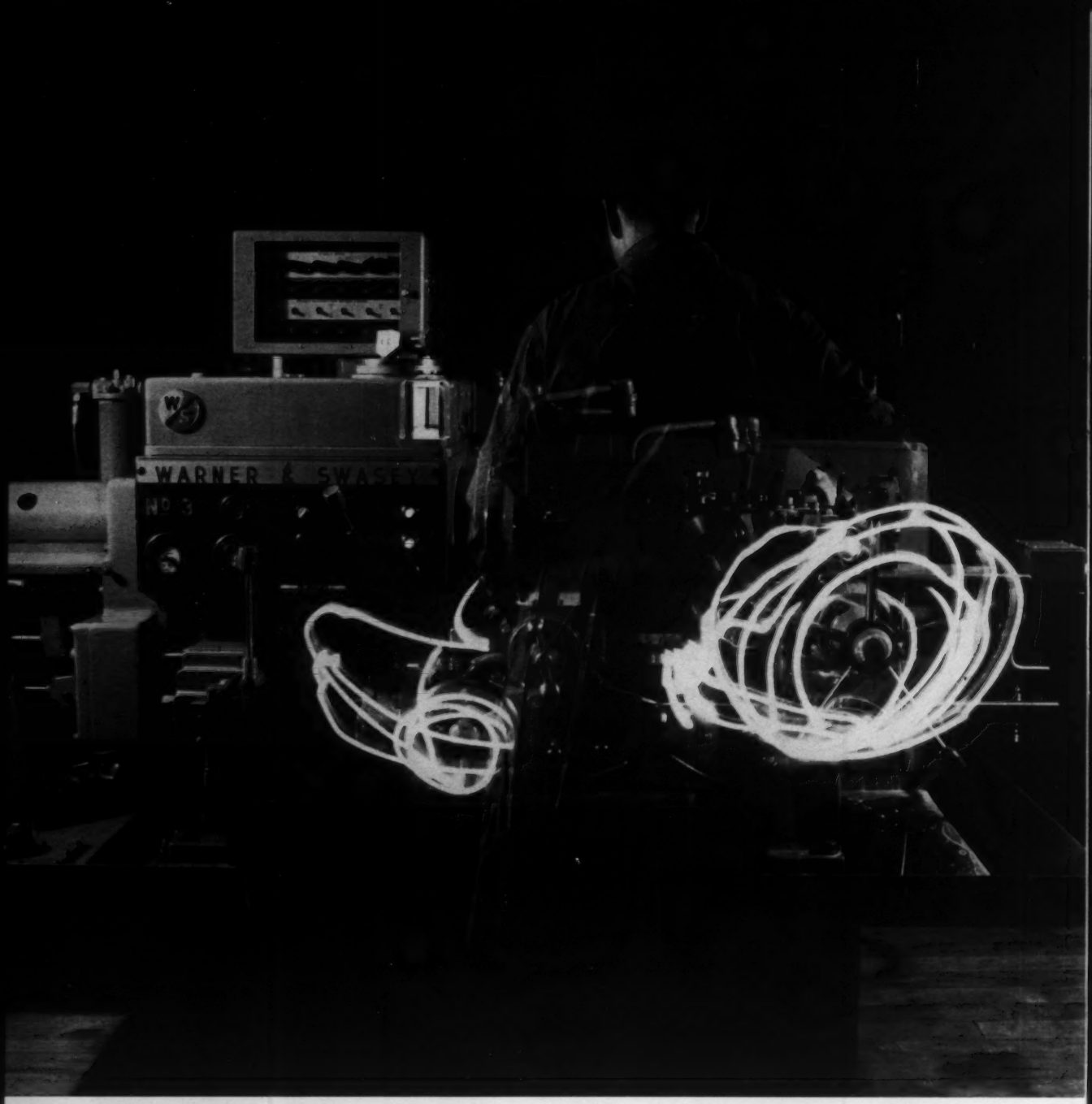
AJAX MAGNETHERMIC, CANADA, LTD. Box 779 • Ajax, Ontario



Hands off the headstock! Electro-Cycle automates spindle start, stop, reverse and speed changes throughout the entire machining cycle. With headstock handling eliminated, the operator develops a highly efficient rhythm for fast-cycle production. Turret lathes with exclusive Electro-Cycle control are built by The Warner & Swasey Company, Cleveland.

Marketman

L. E. Browne is one of our veterans. He joined STEEL in 1927 after writing for New England newspapers and Cutler Publications. His specialty is market reporting in the New England area.

Brownie is also an expert on the fabrication of structural steel and the use of strip and wire.

Prophecy

Here's a prediction from the *Congressional Record*, circa 1875:

"A new source of power, which burns a distillate of kerosene called gasoline, has been produced by a Boston engineer. Instead of burning the fuel under a boiler, it is exploded inside the cylinder of an engine. This so-called internal combustion engine . . . begins a new era in the history of civilization . . . Never in history has society been confronted with a power so full of potential danger and at the same time so full of promise for the future of man and for the peace of the world.

"The dangers are obvious . . . Horseless carriages propelled by gasoline engines might attain speeds of 14 or even 20 miles per hour. The menace to our people of vehicles hurtling through our streets and poisoning the atmosphere would call for prompt legislative action, even if the military and economic implications were not so overwhelming . . ."

Changing Mind

A widely used textbook for college economics is *Economics, An Introductory Analysis*, by Prof. Paul A. Samuelson of Massachusetts Institute of Technology. Here are extracts from successive editions:

First and second editions, 1948 and 1951: "If price increases could be held down to, say, less than 5 per cent per year, such a mild steady inflation need not cause too great concern . . ."

Third edition, 1955: "If price increases could be held down to, say, less than 3 per cent per year, such a mild steady inflation need not cause too great concern . . ."

Fourth edition, 1958: "If price increases could be held down to, say, 2 per cent per year, such a mild steady inflation need not cause too great concern . . ."

Fifth edition, 1961: "Price increases that could be held down below 2 per cent per year are one thing. But . . ."

And on the TV program, Meet the Press, March, 1961: ". . . if we can hold things down so that the official index of prices goes up no more than 1.5 or 2 per cent, I shall be content."

The U. S. Chamber of Commerce, which compiled the quotations, hopes the professor will keep on talking and writing.

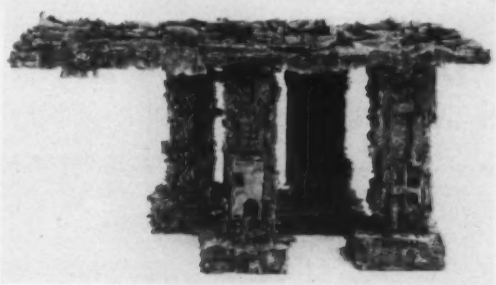
Coming Up

In just four weeks, STEEL's fifth impact issue will be in your hands. It concerns metalworking's technical renaissance. A team of 16 editors is hard at work on the job.

Geraldine, cleaning woman and night editor, reports: "They're putting in some mighty late hours. I can't get my cleaning done proper."

We calmed her down by informing her it was all in the interest of good journalism. For the duration, she'll "clean 'round them."

Metal in Art



The 1961 Pittsburgh International Exhibition of Contemporary Painting & Sculpture in the Fine Art galleries of Carnegie Institute will be open until next Jan. 7.

If you're around that way, we suggest you drop in—if only to see some remarkable examples of sculpture in metal. The one pictured here is an untitled work in cast iron by Julius Schmidt, a U. S. sculptor. There are many others equally as baffling.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

ACME'S *NEW* ILLUSTRATED CATALOG

JUST OFF THE PRESS

A PRACTICAL ENCYCLOPEDIA OF POWER TRANSMISSION PLANS AND IDEAS!

This new 106-page ACME catalog is of tremendous help in the planning and application of roller chains in power transmission drives. There are 35 examples of chain drive layouts and engineering data. It also contains complete information, including prices, on roller chains, sprockets, standard and made-to-order conveyor attachments.

We'll be glad to send you a copy FREE Write Dept. 10-Z today.

Acme Chain Corporation

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The Metalworking Weekly

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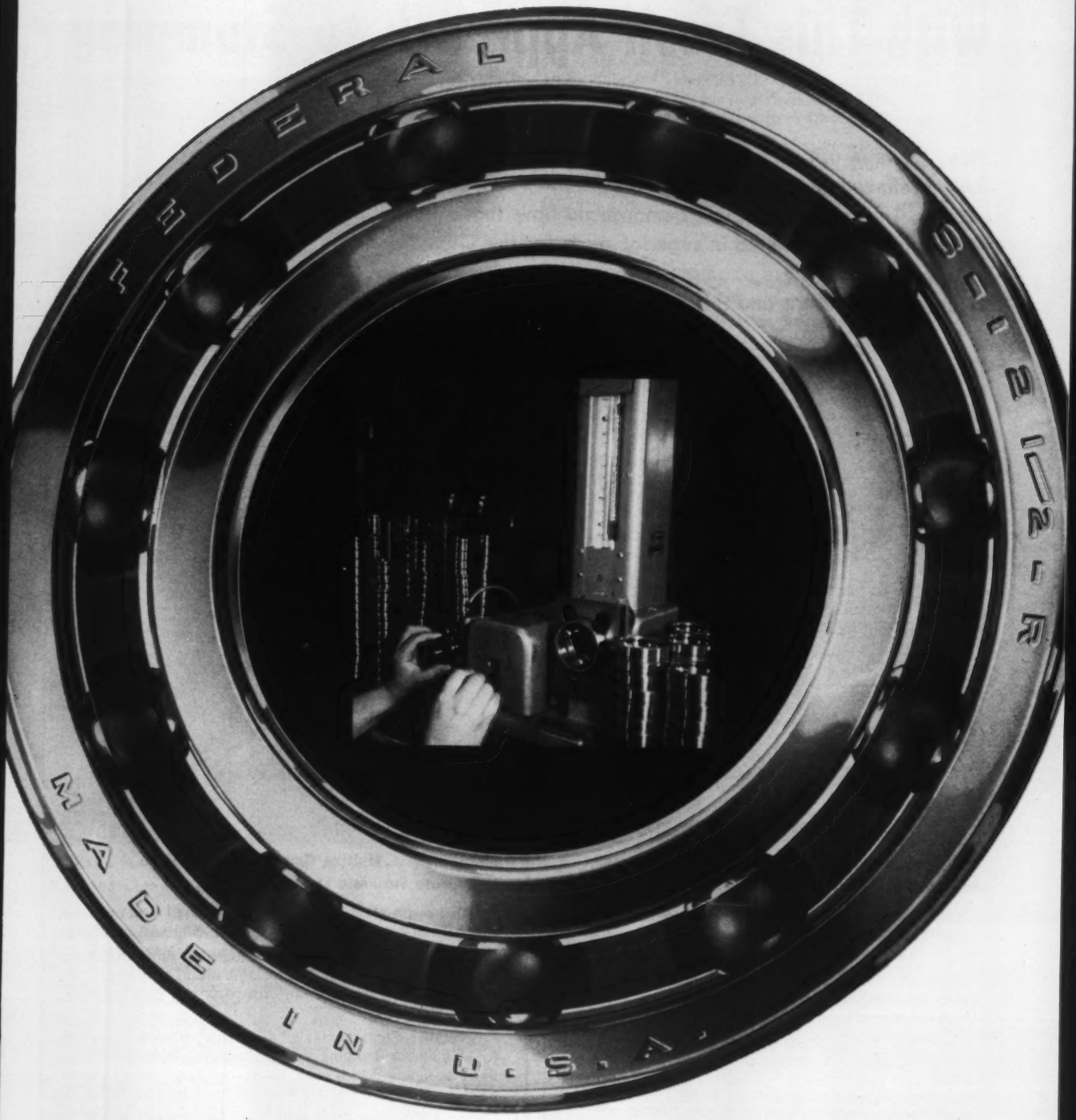
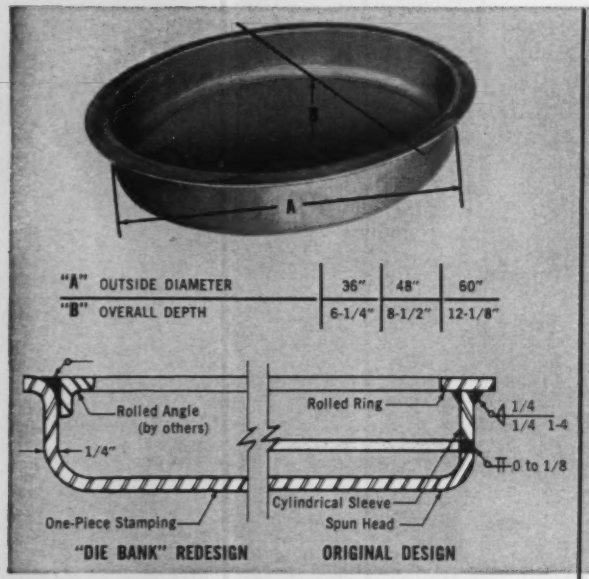


double-check Inner and outer race diameters of Federal Ball Bearings are gaged simultaneously to determine proper size of balls needed to assure the desired internal clearance for specific applications. Such selective assembly of mating parts shows up in more precise bearing performance. Another reason why so much of industry turns on Federal Ball Bearings. Our catalog gives vital statistics on hundreds of types in all sizes. Radial, angular contact, thrust, self-aligning, shafted. Single and double row. Open and sealed. Send for your copy today. The Federal Bearings Co., Inc., Poughkeepsie, N. Y.

Superior Parts at Lowered Cost with This Fresh Approach to Stamping

Many parts in use today are better as a result of design refinements suggested by COMMERCIAL's stamping experts. The examples below demonstrate how these design refinements have resulted in superior parts for the OEM at lowered cost. These examples may appear to you as unusual in design and this is the point...

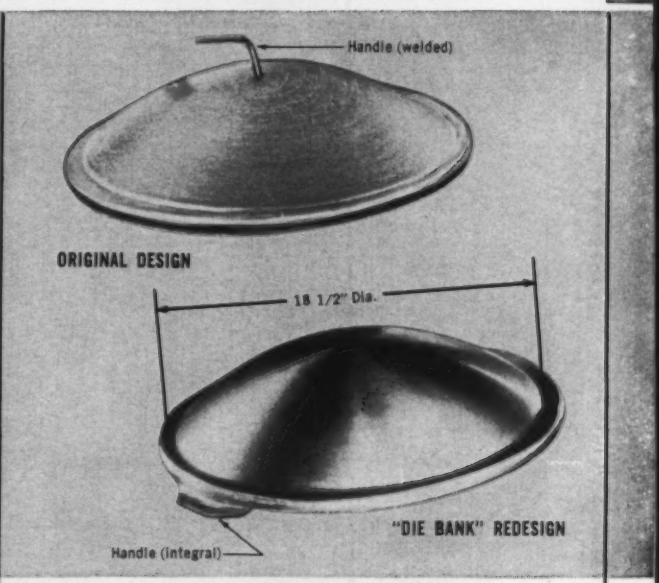


One Piece Stamping . . . Improves Appearance, Replaces Three Piece Weldment

Circular steel boiler doors 36", 48", 60" diameter were formerly fabricated from three basic components—spun head, cylindrical sleeve and ring rolled the hard way.

Problem: eliminate accumulative assembly variables caused by inherent non-uniformity of three components—upgrade product appearance.

Solution: one piece smooth surface COMMERCIAL steel stamping shaped in a die assembled from stock "die bank" components (for details of "die bank", see box upper right). Stamping tolerances plus or minus 1/16" (flat across flange within 1/16"). Result—accurate finished product because former difficult assembly and time-consuming fitting-up problems eliminated. All outside exposed welds (about 16 ft. on the 48 in. size) and grinding discontinued. An end product with improved appearance—better product appeal.



Stampings . . . Unitize Construction, Replace Inaccurate Stainless Steel Spinnings

Original contruction of bulk milk cooler used tank manhole cover spinning—requiring welding, grinding and polishing.

Problem: reduce production finishing time, overcome welding heat distortion of stressed metal-spinnings, increase strength, produce uniform parts and improve sanitation properties.

Solution: COMMERCIAL's "die bank" proved a nucleus for a one-piece stamping redesign including integral handles. Basic stamping details—size, shape and gauge were tailored to stock die components. Realization—smoother finish of stamping creates a more sanitary, better appearing tank. Closer tolerances of stamped cover provide flange with definite "drop-on" vacuum seal. Fewer parts resulting from stamping. Unitization greatly diminishes production time and component cost.

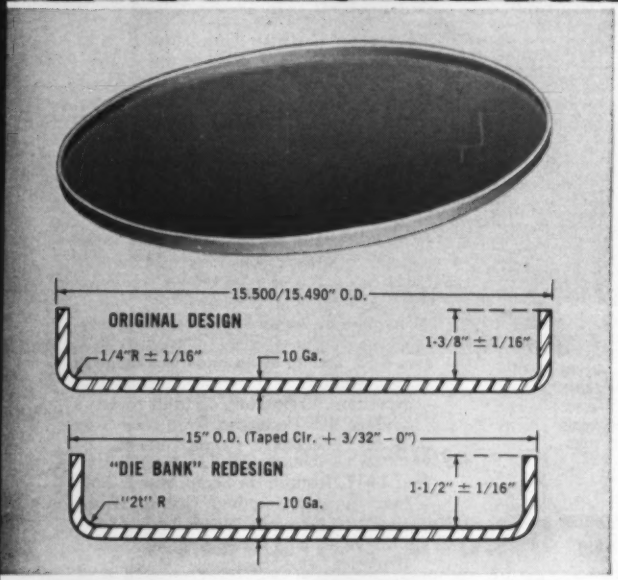
"Die Bank" Facts

Over 50,000 stock die components stand ready to go to work for you at COMMERCIAL. These components can be combined in endless variety—can prove, as they have for others, invaluable in your stamping design.

Components for circular stampings cover a diameter range from 2½" to 72". To 30" O.D., increments are in units of 1". Over 30" O.D., increments progress from 1" up to 6" for the largest diameter. Under 24" O.D., many sizes are available in fractional inches.

Stampings from these die components range from 20 gauge to ¾" thick. Contour can be flat or dished to any one of many patterns. Stampings can be supplied with vertical, horizontal or reverse flanges—or without any flange.

Use of COMMERCIAL's "die bank" results in many stampings made to basic original design free of heavy tooling cost—minor design latitude often eliminates all die expense. Catalog 200-C1 "Standard Metal Shapes" should be in your hands when preliminary designs go on the board.



"Die Bank" Stamping Gets O. K. . . .
Reduces Cost of Tailored Design

Original design of agriculture combine cylinder head called for odd fractional dimensions. Tolerances were tighter than necessary and applied in conflict with best stamping practice. Details were established without knowledge of COMMERCIAL's "die bank". Result—high unit cost to produce basic part to individually tailored size. Special dies, not in existence, were required.

Problem: redesign a more practical part to be mass produced at low unit-cost—eliminate special die cost.

Solution: simple redesign using stock die components from COMMERCIAL's "die bank" cancelled out $1850 partial die cost required for tooling original design. Net die cost: zero. Piece price reduced: 16 cents. Savings on initial requirement: over $2200. A stamping made to commonly accepted tolerances at lower cost without sacrificing product quality was the answer.

Advantages of Stampings

Economy of production
—metal conservation, waste material minimized, stamped parts have greater surface area than blank the part is made from—without loss in strength
—high quantity man-hour output from fast production machines—low unit cost

Greater strength: predicted, controlled, unvarying
—higher proportionately, in relation to weight, than possible in other metalworking processes

Enhanced appearance: finish is predictable, uniform, "as specified"
—multiple selection of basic material and its finish facilitates maintaining appearance in stamping the part or its further processing

Features of COMMERCIAL Stampings

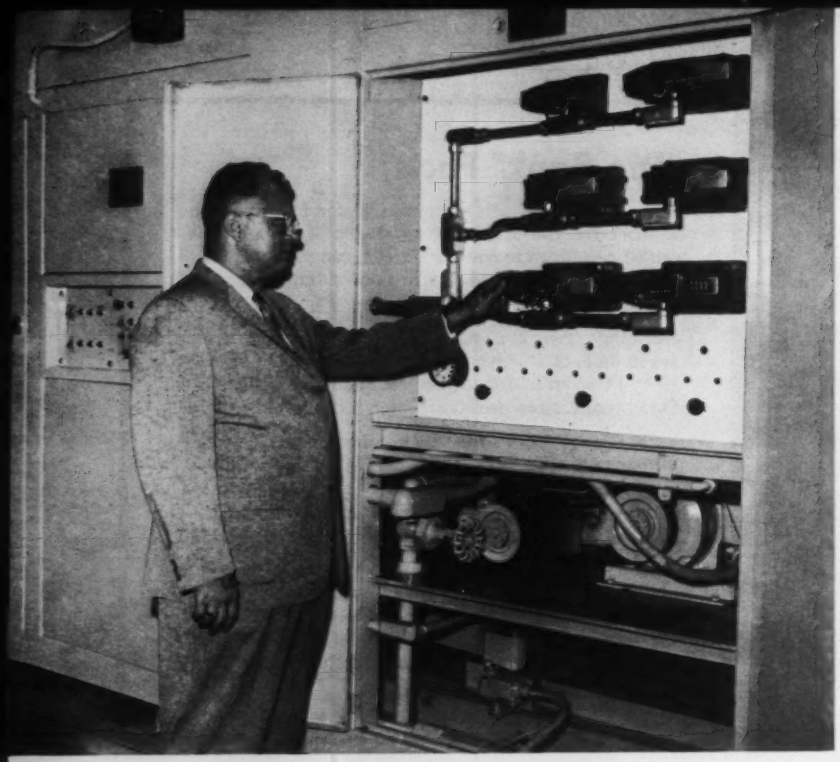
Specialized equipment
—modern presses with capacity over 2000 tons; facilities located in three strategic metal producing centers

Economical large or small runs
—medium to heavy, shallow or deep drawn stampings

Facilities for finishing
—drilling, boring, tapping, machine trimming, burning, welding, painting, etc.

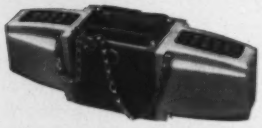
While designs are on the board, or redesign of parts in usage are fresh in mind, why not call on COMMERCIAL'S technical service—send print, sketch, sample or prototype. Address: Commercial Shearing & Stamping Company, Dept. L-49, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping



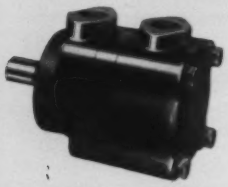
ALVEY USES THESE VICKERS COMPONENTS

DOUBLE PUMPS—Vickers double pumps provide power for multiple circuits from a central source, feature long life, minimum maintenance, quiet operation. Various combinations are available for deliveries from 1.0 to 34 at the head end and 1.0 to 55.0 gpm at the shaft end, pressures to 2000 psi.



DIRECTIONAL VALVES—Both single- and double-solenoid directional valves are used on the pallet loaders. Vickers exclusive *QEL solenoids are featured. Complete line of valves and controls accommodates flows to 440 gpm, pressures to 3000 psi.

*Quiet, Extended Life.



BALANCED VANE MOTORS—Durable construction, high operating efficiency, long life and low maintenance costs are features of Vickers vane motors. Broad line of fluid motors includes fixed and variable models with horsepower ratings to 350 hp.

CHECK AND RELIEF VALVES—A complete line of valves—relief, sequence and unloading, sequence and check, pressure reducing, unloading and relief valves—is available to meet every system need.

For details about components above and the entire Vickers line, write for Catalog 5001C. Vickers Incorporated, Division of Sperry Rand Corporation, Detroit 32, Michigan.

9958

VICKERS®

DIVISION OF SPERRY RAND CORPORATION

CALENDAR

OF MEETINGS

Dec. 5, Electric Overhead Crane Institute Inc.: Annual meeting, Carlton House, Pittsburgh. Institute's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: Joe H. Peritz.

Dec. 6-8, Metallurgical Society of AIME: Annual electric furnace conference, Iron & Steel Division, Penn-Sheraton Hotel, Pittsburgh. Society's address: 345 E. 47th St., New York, N. Y. Secretary: R. W. Shearman.

Dec. 6-8, National Association of Manufacturers: Annual meeting, Waldorf-Astoria Hotel, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Executive vice president: Charles R. Sligh Jr.

Dec. 7-8, Engineering Institutes: Industrial plant maintenance course, University of Wisconsin in co-operation with American Institute of Plant Engineers. Institute Co-ordinator: William W. Wuerger, Extension Division, University of Wisconsin, Madison 6, Wis.

Dec. 7-8, Society of the Plastics Industry Inc.: Plastic film, sheeting and coated fabrics conference, Pierre Hotel, New York. Society's address: 250 Park Ave., New York 17, N. Y. Executive vice president: William T. Cruse.

Dec. 27-29, American Marketing Association: Annual winter meeting, Biltmore Hotel, New York. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: Vance E. Lockhart.

Jan. 8-12, Society of Automotive Engineers Inc.: Annual engineering congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 14-17, Institute of Scrap Iron & Steel Inc.: Annual meeting, Statler Hilton Hotel, Washington. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: William S. Story.

Jan. 15-17, AIME Minnesota Section and University of Minnesota: Annual iron ore mining symposium, Hotel Duluth, Duluth. Contact: Fred E. Berger, director, Center for Continuation on Study, University of Minnesota, Minneapolis 14, Minn.

Jan. 15-19, Steel Plate Fabricators Association: Annual meeting, Mountain Shadows Hotel, Scottsdale, Ariz. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 17, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 345 E. 47th St., New York 17, N. Y. Secretary: L. K. Wheelock.

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". . . of the Alvey Automatic Pallet Loader. This equipment can, without stalling, palletize over 60 cases of products per minute, depending on case size. One Alvey Pallet Loader can be equipped to accommodate a wide variety of package sizes. Its electrically controlled hydraulic circuit assures smooth operation at fast speeds, thus helps prevent damage to fragile cartons and their expensive contents.

"The equipment must also be dependable and easy to service. We were able to meet these specifications, by working closely with Vickers engineers to select components matched precisely to our operating requirements.

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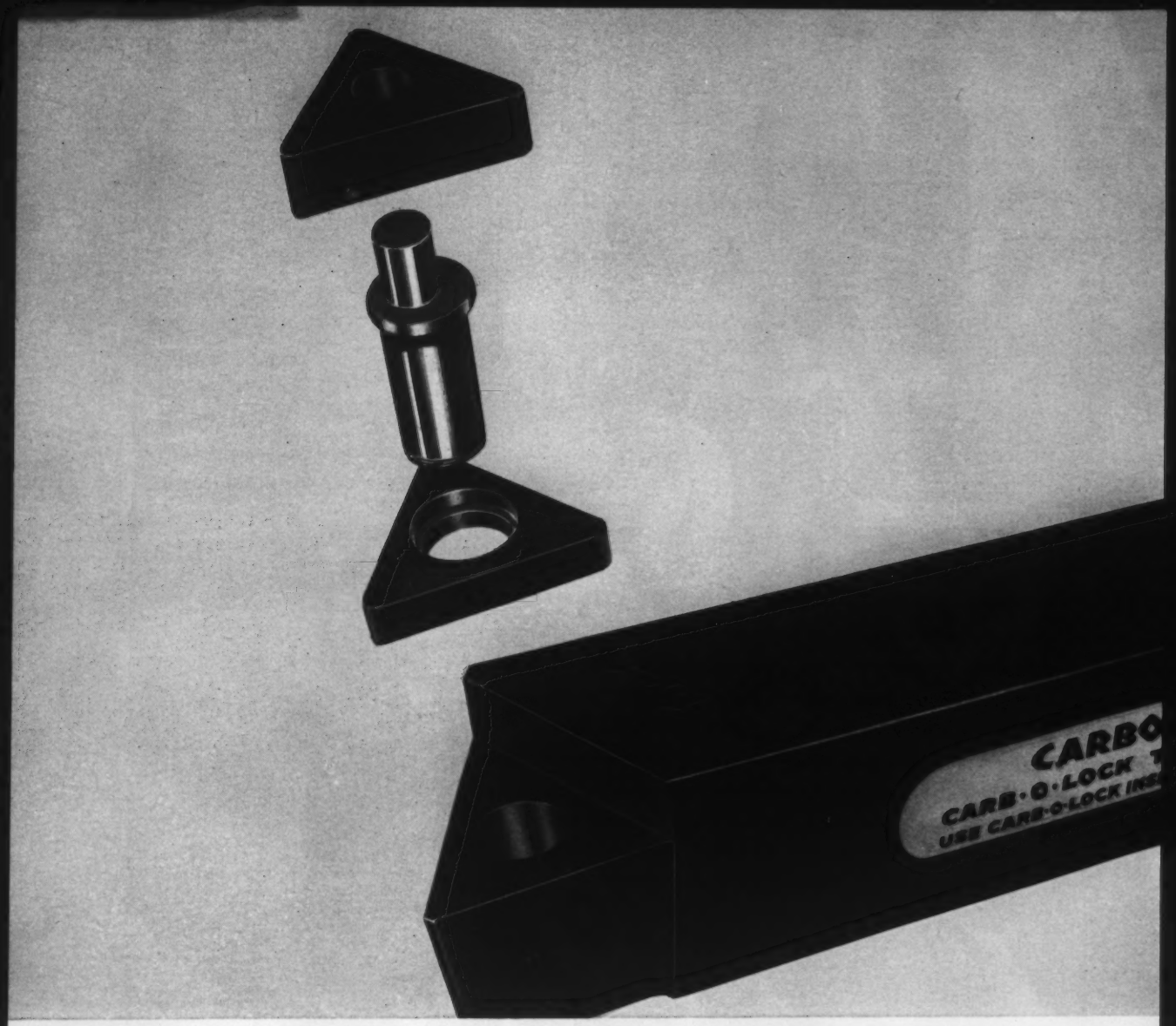
DIVISION OF SPERRY RAND CORPORATION

How to cut your disposable-tooling costs by 30 per cent at no sacrifice in quality or output. (Answer is on the next page.)



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These are minimums. Users of the Carboloy Carb-O-Lock toolholder-insert combination have reported savings many times higher. Why?

Simple. The Carb-O-Lock design is simple. Using a cam-action locking principle, the Carb-O-Lock has just three parts (not including insert). Insert changing and indexing is a breeze; parts inventories can be held to absolute minimums. Streamlined design lets you bring the toolholder closer to your work. And less overhang means less vibration, less insert chipping and breaking.

Plus: the Carb-O-Lock gives you proven performance. A major diesel engine manufacturer discovered Carb-O-Lock allowed nearly triple the feed, eliminating two machines. A locomotive and car equipment company found Carb-O-Lock's simple, rugged design reduced time for tool changes and permitted maximum horsepower utilization.*

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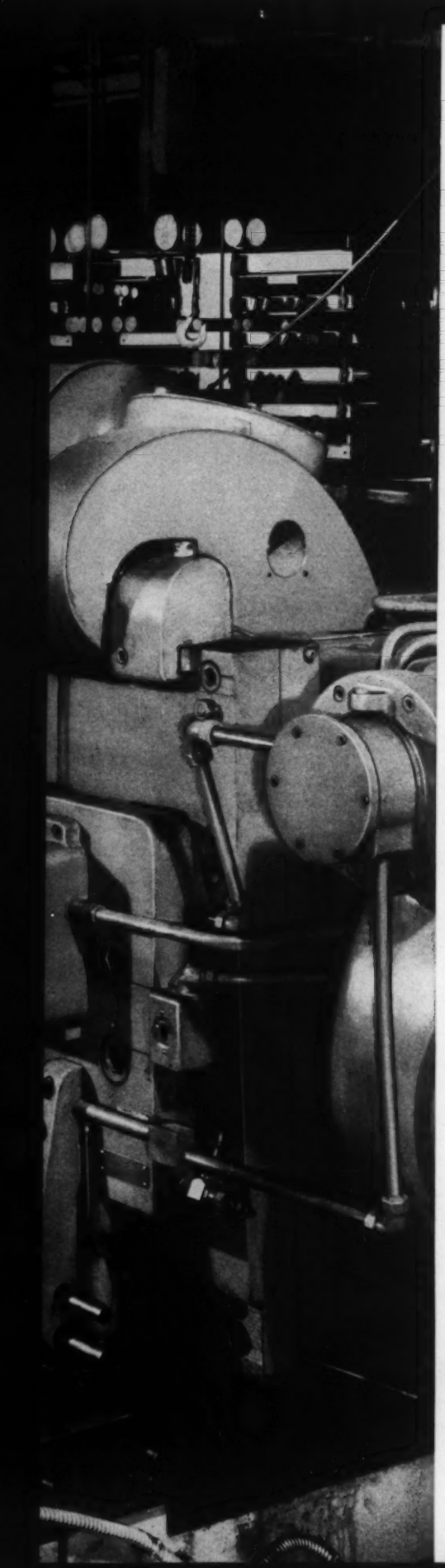

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. . . service is their middle name!

Modern Steel Service Centers are a great deal more than materials distribution centers. Look upon them as a profit-building extension of your own operations.

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Then, there's inventory planning and control. Anticipating material requirements for even *one* plant isn't easy . . . but your Steel Service Center does it for dozens. Successfully, too, and same-day delivery is a matter of pride as well as service.

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SOME OF THE MANY REPUBLIC STEEL PRODUCTS . . . AND PRE-PROCESSING SERVICES OFFERED BY YOUR STEEL SERVICE CENTER . . .	In steel: carbon, alloy, stainless, high strength; sheets, strip, bars, plates, pipe, tubing, wire, rods.
	Cutting, shearing, flame-cutting, sawing, sheet flattening, and grinding.

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the *exact* steel you need
when you need it!

We can produce
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to your exact specifications and
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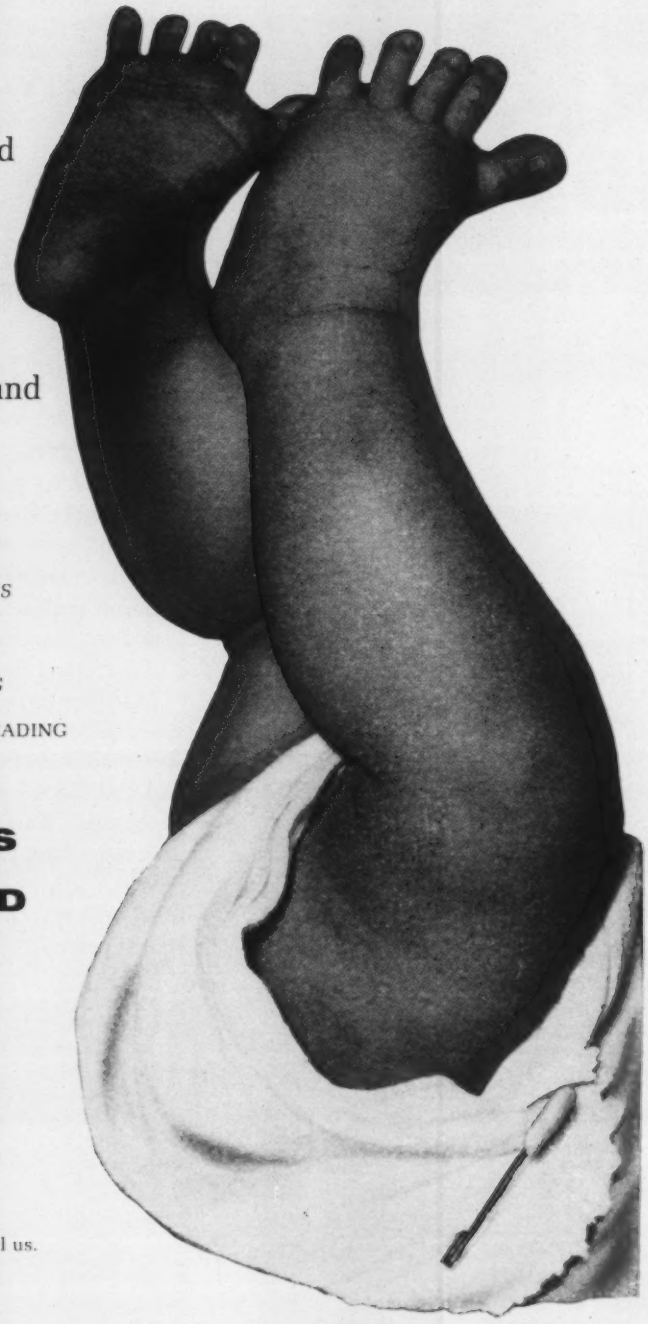

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OURS CAN

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and personal service that can
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Significant Gains in Store for Appliance Industry

John W. Craig, vice president, Westinghouse Electric Corp., says: "It is likely that major appliance industry sales in 1962 will increase approximately 5 per cent above the 1961 totals." Also significant: It will be the first time in six years that the industry has shown two successive years of sales improvement; appliance prices appear to be firming; and the industry is likely to capture a bigger share of consumer discretionary income, reversing a recent trend.

Used Machinery Sales Leap Ahead

The Machinery Dealers National Association reports its index of used machine tool sales rocketed to 134.7 in October (1957 monthly average = 100). Topping the September level by 34 per cent, that is the highest mark registered since the association began recording monthly sales in April, 1957.

Japanese to Market Colored Galvanized Sheets

At least one Japanese steel company will begin marketing colored galvanized sheets in January. STEEL is investigating the move for a later report. The color adding method has not been revealed, but one Japanese technical paper discusses the feasibility of baking a special resin onto the sheets.

Manufacturers Uncertain about 1963 Capital Spending

The Federal Reserve Bank of Philadelphia asked manufacturers in the Philadelphia region what change in capital expenditures they expected between 1962 and 1963. The response: Uncertainty. Nearly two-thirds of the firms could not estimate the direction of change; the others were nearly evenly divided into "up" and "down" groups:

	Percentage of Firms Expecting		
	Increase	No Change	Decrease
All Manufacturing	20.4	62.9	16.7
Durables	21.6	62.1	16.3
Primary Metals	15.8	68.4	15.8
Fabricated Metals	32.5	55.0	12.5
Machinery	26.1	52.2	21.7
Electrical Machinery	30.4	47.8	21.7
Transportation Equipment	0	77.8	22.2
Instruments & Misc.	0	85.0	15.0

Kennedy Action on Silver Surprises Industry

Last Tuesday, Nov. 28, President Kennedy proposed to pull the government completely out of the silver market. Industry observers were caught by surprise despite the fact that they knew the Treasury Department's free

stocks were nearly exhausted. Said Donald J. Ramsey of the Silver Users Association: The action "went even farther than we have been suggesting for years." Some Wednesday morning sales were reported at $1.03 per troy ounce (former price was 99.325 cents). But an official of Handy & Harman, New York supplier, doubts the price will reach the practical limit of $1.29 an ounce. Nor does he expect shortages to develop in the foreseeable future.

Business Abroad

Raytheon Co. and Japan Radio Co. (Tokyo) have completed plans for a new electronics firm which will engineer and produce a complete line of microwave tubes for markets in the Far East . . . British steel production averaged 382,200 tons a week in October—4.5 per cent below September's rate and 23 per cent below the mark set in October, 1960 . . . Immediate cutbacks in German steel production of 15 to 20 per cent may remain in effect until next spring, says the German-American Chamber of Commerce.

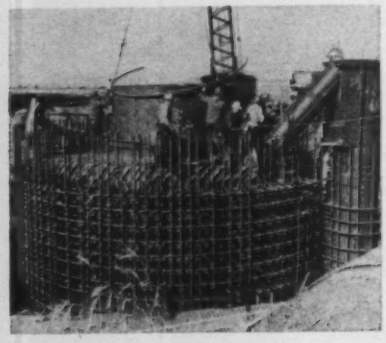
Profit Squeeze Attributed to Passive Management

Too many managers "rationalize their responsibility for the squeeze on profits by simply blaming the unions and the government," declares Robert B. King, president, Profit Counselors Inc. "Management forgets the passive role it has played while wage increases have outrun productivity and increased taxes have crippled capital outlays." Mr. King says the profit squeeze is only a superficial manifestation of "weak management attitudes and philosophies which spawn weak men and methods."

Oil-Coal Slurry New Blast Furnace Fuel

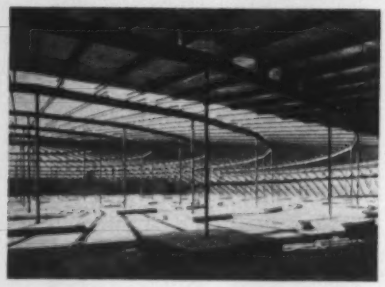
Blast furnace operators expect substantial savings in fuel costs, plus higher hot metal yields, to result from a new supplementary fuel—a slurry of fuel oil (35 per cent) and coal (65 per cent). Oil producers and steelmakers are co-operating to develop devices for injecting the slurry, preheated to around 200° F, into the blast furnace. Fuel cost savings and yield increases are said to be higher than with supplementary fueling with natural gas, straight fuel oil, or powdered coal.

Housing Project for the Minuteman



Crews from American Bridge Div., U. S. Steel Corp., place reinforcing steel around the equipment room which forms the upper portion of a Minuteman silo. More than 100 of the missile launching sites are being constructed in a 20,000 square mile area of northern Montana. The job: Erect 39,000 tons of structural and reinforcing steel to house the missiles and launch control centers.

Capacity: 10 Million Gallons



It's not a stadium—it's not a large auditorium. It's a 10 million gallon reservoir. This mammoth storage tank is 16 ft high, 338 ft in diameter. Graver Tank & Mfg. Co., Chicago, a division of Union Tank Car Co., is building three such tanks near Detroit for the Wayne County water supply system.

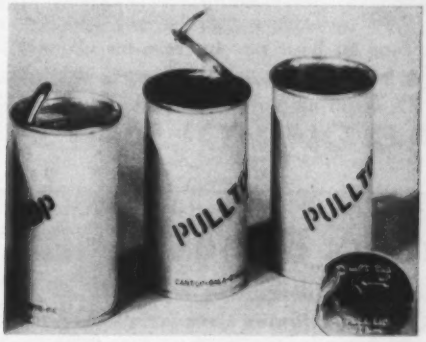
Unions Facing Up to Foreign Competition

That was demonstrated in a Washington meeting of the International Association of Machinists last week. As in industry, there's no unanimity on solutions; but George Meany, AFL-CIO president, promised the Machinists that labor won't endorse President Kennedy's liberal trade program if he doesn't come through with "trade adjustments" aimed at helping communities, workers, and business affected by foreign competition—see the story on Page 45.

Random Storage Technique Expands Warehouse Space

A random, cubicle storage system installed at the Transformer Div. of Westinghouse Electric Corp. handles finished goods and raw materials in about one-third of the space formerly required. It also effects substantial savings and facilitates operations. To learn how the system works, see Page 90.

Exodus of Can Opener?



Beverage cans with lift-off tops, or tabs that pull off and expose a preformed pour opening may not be far off. Can-Top Machinery Corp., Philadelphia, says it has developed a simply designed machine that produces either type of end at the rate of 400 a minute.

Canadian Firm Exploits Low Grade Ore Deposits

Successful tests on a recovery method for low grade, magnetic iron ores have been announced by Harry L. Issacs, president, Can-Fer Mines Ltd., Toronto,

STEEL
The Metalworking Weekly

December 4, 1961 Vol. 149 No. 23

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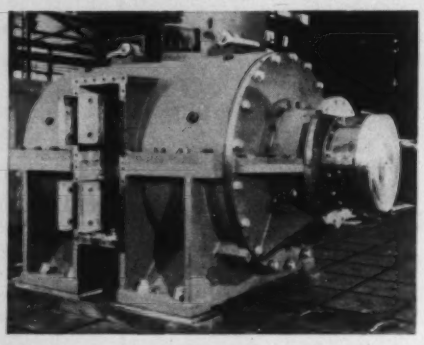
Editorial index available semiannually.

STEEL is also indexed by
Engineering Index Inc.
345 E. 47th St., New York 17, N. Y.

Ont. The firm has access to almost 11 million tons of the low grade ore (8 to 12 per cent iron). Through a series of alternate cobbing and magnetic separation steps and the use of conventional concentration techniques, the ore can be upgraded to hematite pellets with an iron content of 64.4 per cent.

GE Announces New Acyclic Generator



Development of a new type of direct current generator (it uses a liquid metal collector rather than a commutator) has been announced by General Electric Co. The acyclic generator can produce high amperage, direct current at low voltage — a characteristic which fits the needs of aluminum reduction and chlorine production.

Manpower Inventory Program

An "Employer's Inventory of Critical Manpower" has been designed to help managers analyze their manpower situations in light of selective service and military reserve regulations and take steps to minimize disruption of production. It's available from the Engineering & Scientific Manpower Commissions, 345 E. 47th St., New York 17, N. Y.

Straws in the Wind

Walter Moore, director, commercial research, Jones & Laughlin Steel Corp., says the steel industry expects to produce 62 million ingot tons in the first half of 1962 . . . The Labor Department's index of consumer prices for October creeped to 128.4 per cent of the 1947-49 average (a new high). It means a 1 cent an hour pay increase for about 930,000 workers . . . North American Aviation Inc. has a contract to design and build NASA's Apollo spacecraft. It could amount to $2 billion over the next five years.

Metalworking Pulse

The Business Trend: The Thanksgiving holiday brought about a 10 point decline in STEEL's industrial production index for the week ended Nov. 25. It was expected all of the loss would be regained in the following week. **Autos:** No letup is scheduled in output until the Christmas and New Year holidays. Overtime is heavy as sales maintain a record pace. **Steel:** The ingot rate advanced as steelmakers forecast a satisfactory December and decided upturn in 1962.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Nov. 25 .... 165†
  Year ago 138
  Details on Page 65
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Dec. 2 .. 155,000*
  Year ago 135,348
  Details on Page 62
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Dec. 2 2,040,000*
  Week ago 2,032,000
  Details on Page 134

†Preliminary. *Estimated.

TORRINGTON

WHY DESIGNERS DO A "DOUBLE-TAKE" ON TORRINGTON SELF-ALIGNING BALL BUSHINGS

This Self-aligning Ball Bushing is designed for tough work...takes misalignment in its stride while supporting the heaviest radial, thrust or combined loads. Even low frequency oscillating operation can be accommodated.

Self-aligning ball bushings, so simple and inexpensive, are often overlooked. Take a look at Torrington's for the best solution to many misalignment and heavy loading problems.

Both the ball (inner ring) and the mating, spherically ground outer ring, are made from bearing quality steel. The outer ring has a cylindrical O.D. to permit normal mounting. Oil holes and grooves permit relubrication through either shaft or housing.

You'll find the Torrington Self-Aligning Ball Bushing is the most effective answer to tough, heavy-duty problems. For details, call or write us today.

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SELF-ALIGNING
BALL BUSHINGS

Series SBB

(for industrial applications)

All surfaces phosphate coated and treated with dry film molybdenum disulphide lubricant.

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY South Bend 21, Indiana • Torrington, Conn.

NEW ADDITIONS

to the Allegheny Ludlum High Strength and High Temperature Steels

AL REFERENCE DATA

Compiled by
ALLEGHENY LUDLUM STEEL CORPORATION
Oliver Building • Pittsburgh 22, Pennsylvania

	Alloy Name	NOMINAL CHEMICAL COMPOSITION											
		C	Mn	Cr	Ni	Co	Mo	W	Ti	Al	B	Fe	Others
Fe-Base	19-9DL	.30	1.0	19	9	..	1.4	1.3	.3	...	...	66	.4 Cb
	19-9DX	.30	1.0	19	9	..	1.6	1.3	.6	...	...	66	.....
	AF-71	.30	18	12.5	...	..	3	...	...	...	.2	73	.2N, .9V
	A-286	.05	1.4	15	26	..	1.25	...	2.2	.2	.003	54	.3 V
	Discaloy	.05	.6	13	26	..	3	...	2	.2	...	54	.....
	G-192	.60	8.5	22	...	..	.....	...	...	...	...	69	.35 N
	V-57	.06	.25	15	26	..	1.3	...	3	.2	.008	54	.2 V
Fe-Ni	D-979	.05	.6	15	45	..	4	4	3	1	.01	27	.....
	AL 901	.05	.25	13	43	..	6	...	2.9	.2	.015	35	.03 Zr
Ni-Base	Waspaloy	.05	.3	19	56	14	4	...	3.0	1.3	.005	1	.....
	M-252	.15	.5	19	55	10	10	...	2.5	1	.005	2	.....
	R41	.10	.3	19	53	11	10	...	3.2	1.6	.005	2	.....
Co-Cr-Fe-Ni	S-590	.43	1.2	20	20	20	4	4	...	...	...	29	4 Cb
	N-155	.15	1.5	21	20	20	3	2.5	...	...	...	32	1 Cb
Co-Base	S-816	.40	1.2	20	20	44	4	4	...	...	...	3	4 Cb
	V-36	.30	1	25	20	42	4	2	...	...	...	3	2 Cb
	L-605	.15	1.5	20	10	53	....	15	...	...	...	...	.....

A number of the names listed above are tradenames of companies other than Allegheny Ludlum Steel Corporation

AL REFERENCE DATA

Compiled by
ALLEGHENY LUDLUM STEEL CORPORATION
Oliver Building • Pittsburgh 22, Pennsylvania

	Alloy Name	Density lb/in.³	100-Hr. Rupture Strength at (X 1000 Psi)				Short Time Properties					
			1200F	1350F	1500F	1600F	Room Temperature			1200 F		
							TS	.2YS	Elong. %	TS	.2YS	Elong. %
							(X 1000 Psi)			(X 1000 Psi)		
Fe-Base	19-9DL	.287	52	28	17	...	118	69	55	75	37	33
	19-9DX	.287	52	28	17	...	118	69	55	75	37	33
	AF-71	.280	69	40	22	...	150	110	30	90	77	43
	A-286	.286	63	35	15	...	152	110	25	115	87	25
	Discaloy	.288	55	32	15	...	147	92	20	100	77	18
	G-192	.278	42	27	15	...	148	85	55	92	37	15
	V-57	.286	75	40	15	...	172	119	24	129	108	22
Fe-Ni	D-979	.296	94	63	35	21	200	143	18	157	123	17
	AL 901	.294	90	60	20	...	175	125	15	145	110	20
Ni-Base	Waspaloy	.294	98	65	39	24	185	130	28	160	120	22
	M-252	.298	95	62	35	20	180	122	16	155	110	17
	R 41	.296	100	67	44	28	200	150	15	160	130	10
Co-Cr-Fe-Ni	S-590	.301	50	32	22	13	140	75	20	97	70	25
	N-155	.297	50	31	18	12	119	58	40	80	43	55
Co-Base	S-816	.313	60	38	25	16	140	72	35	115	55	27
	V-36	.303	64	35	25	18	145	67	55	95	40	28
	L-605	.330	70	43	24	15	150	70	50	98	48	28

Properties listed above are typical, and should not be used as specification minima.

Mar-Aging Steels...with yields over 250,000 psi PLUS toughness!

Looking for "special" properties even in the special steels? Take a look at the Mar-Aging Steels, a brand new group of high alloy, precipitation-hardening steels offering unmatched toughness and the strength of the best contemporary steels. Here are a few interesting properties ... yield strengths exceeding 250,000 psi... notched tensile strengths over 400,000 psi . . . and the ability to maintain ductile properties below −80 F.

NOMINAL COMPOSITION OF MAR-AGING STEELS

	C	Ni	Co	Mo	Ti	Al	Cb
AL 25 Ni (250)	.01	25	..	..	1.4	.2	.5
AL 20 Ni (250)	.01	20	..	..	1.4	.2	.5
AL 18 Ni Co Mo (250)	.01	18	7	5	.4	.1	..
AL 18 Ni Co Mo (300)	.01	18	9	5	.6	.1	..

Discovered by International Nickel Company, developed and being produced by Allegheny Ludlum, the Mar-Aging steels achieve their high strength by means of an extremely simple heat treatment. Remarkably resistant to crack propagation, the Mar-Aging Steels are easily machinable, easy to weld, and possess unusually low work-hardening characteristics. Available in all product forms, the Mar-Aging Steels may be air melted, or vacuum melted for maximum notch toughness and transverse ductility.

TYPICAL MECHANICAL PROPERTIES OF MAR-AGING STEELS

PRODUCTS	.2 YS (X 1000 psi)	UTS (X 1000 psi)	Elong. %	RA %	Notch TS / Smooth TS
BARS (Heat treated)					
AL 25 Ni (250)	250	265	12	50	1.1
AL 20 Ni (250)	250	265	12	55	1.3
AL 18 Ni Co Mo (250)	250	265	10	50	1.5
AL 18 Ni Co Mo (300)	300	305	12	55	1.4
SHEETS (Cold rolled and aged)					
AL 25 Ni (250)	250	270	5	..	.7
AL 20 Ni (250)	260	270	4	..	.7
AL 18 Ni Co Mo (250)	285	290	4	..	.9
AL 18 Ni Co Mo (300)	300	310	3	..	.8

Together with A-L's family of famous stainless steels (all grades—all mill forms), low alloy-high strength steels, tool steels, bearing steels, and high temperature steels and alloys, the Mar-Aging Steels make the Allegheny Ludlum product line one of the most comprehensive offered to the aircraft and missile industries. And to assist in applying this family of steels, A-L offers customer contact service at any level in your organization, including in-plant teamwork with your specialists on your problems. Add the support of the A-L research organization, and technical literature written in *your* language, and you have the famous Allegheny Ludlum service.

3803

ALLEGHENY LUDLUM

NEW A-L LITERATURE

A new series of technical booklets on A-L High Temperature Alloys is yours for the asking. Each is packed with data to assist design engineers and procurement specialists in selecting materials for any high strength-high temperature application.

And be sure to get your request in early for the new Data Sheet on Mar-Aging Steels. Contact your local A-L Representative, today. Or write: Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address: Dept. MID 6.

a new concept for cutting grinding costs:

RELIABLE

QUALITY

PRODUCTION

Consistent, automatic repeat performance of a cylindrical grinder is dependent upon the combined reliability of work support, wheel support, wheelfeed and wheel dressing.

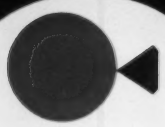
The exclusive features of the new Landis plain grinders are built around these four machine essentials to assure reliable, quality production.

Landis 10" R semi-automatic plain grinder with angular wheelhead combines all new features.

Work Support. Exclusive wedge work rest and loaded ball spindle footstock give maximum rigidity to work parts.

Wheel Support. Exclusive Microsphere bearing reduces sparkout time, speeds production.

Wheelfeed. Exclusive Microfeed® a pulsefeed in millionths to final size meets tolerances on a production basis.



Wheel Dressing. Exclusive Truform dresser with shake-free construction for exact reproduction of all wheel profiles.

LANDIS

LANDIS TOOL COMPANY, WAYNESBORO, PA.

Strong Restraining Influences...

Roebling Hose Reinforcing Wire

Roebling Hose Wire, Hose Reinforcing Wire and Hose Wrapping Wire bear the stamp of Roebling's strict attention to constant uniformity. As with all Roebling wire products, each is wholly Roebling-made and Roebling-controlled, from open hearth to packaging. Tensile strength and forming qualities, finish and gage are of an excellence that proves itself in use.

Resistance to internal and external pressures and wear are what you look for in hose wires and what you pay for. With Roebling, you *get* them.

For further information on these and other Roebling quality products, write or call Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

Roebling...Your Product is better for it

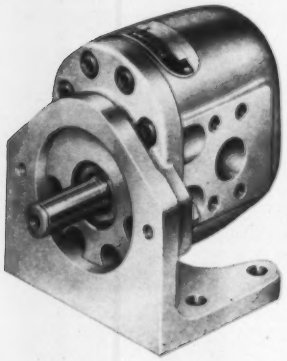
ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

For peak

- **EFFICIENCY**
- **PERFORMANCE**
- **RELIABILITY**
- **ECONOMY**

BERRY/DOWTY*
Hydraulic Gear Pumps



pressures to 3000 psi
speeds to 6000 rpm
outputs to 85 gpm

Berry/Dowty hydraulic gear pumps provide superior performance over a wider range of operating speeds, pressures, temperatures and fluid viscosities than can be obtained with ordinary gear pumps.

How? With advanced design and construction . . . volumetric efficiencies well above 90% . . . an advanced method of wear-compensating pressure loading . . . massive journal-type bearings . . . positive metered lubrication even at 0 psi output . . . low noise level . . . all these in a compact, rugged aluminum housing for minimum weight.

Whether you build or use hydraulic powered equipment, you'll find that Berry/Dowty gear pumps offer far more in performance, reliability and low cost of ownership. Your Bellows-Valvair Field Engineer has proof.

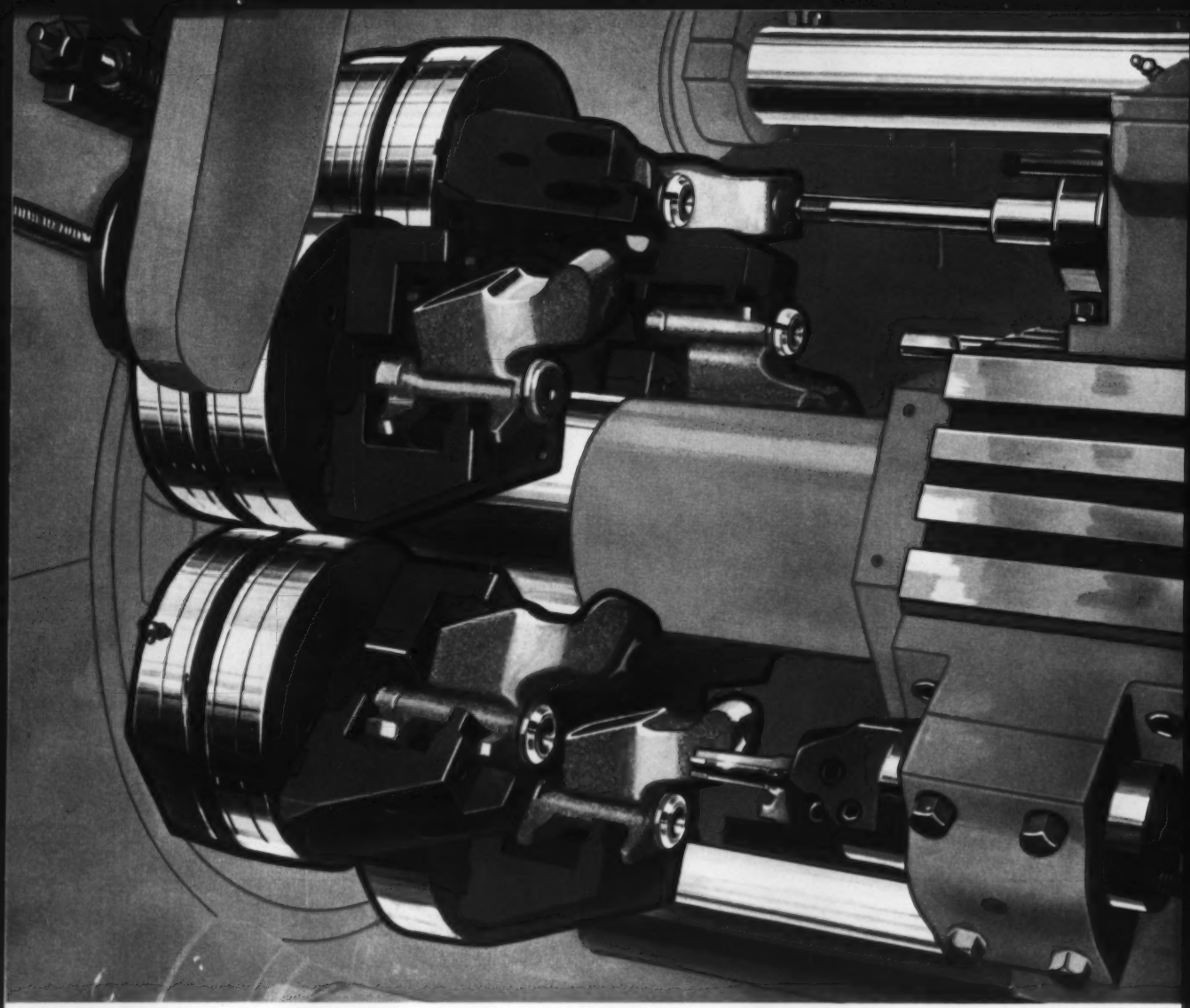
*Manufactured by Berry Hydraulics under license from Dowty Corp. for Bellows-Valvair Hydraulics Division, Salem, Ohio.

3065

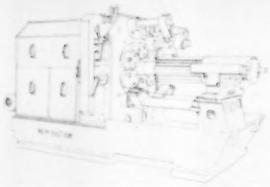
For more information, write for Bulletin HP-311. Address Bellows-Valvair, Hydraulics Division, Salem, Ohio, Dept. ST-1261.

Bellows-Valvair
Division of IBEC SALEM 9, OHIO

These names assure you the best in pneumatic, hydraulic and electronic components
BELLOWS · VALVAIR · SINCLAIR-COLLINS · HUNT · HYQUIP · JACKSON ELECTRONICS



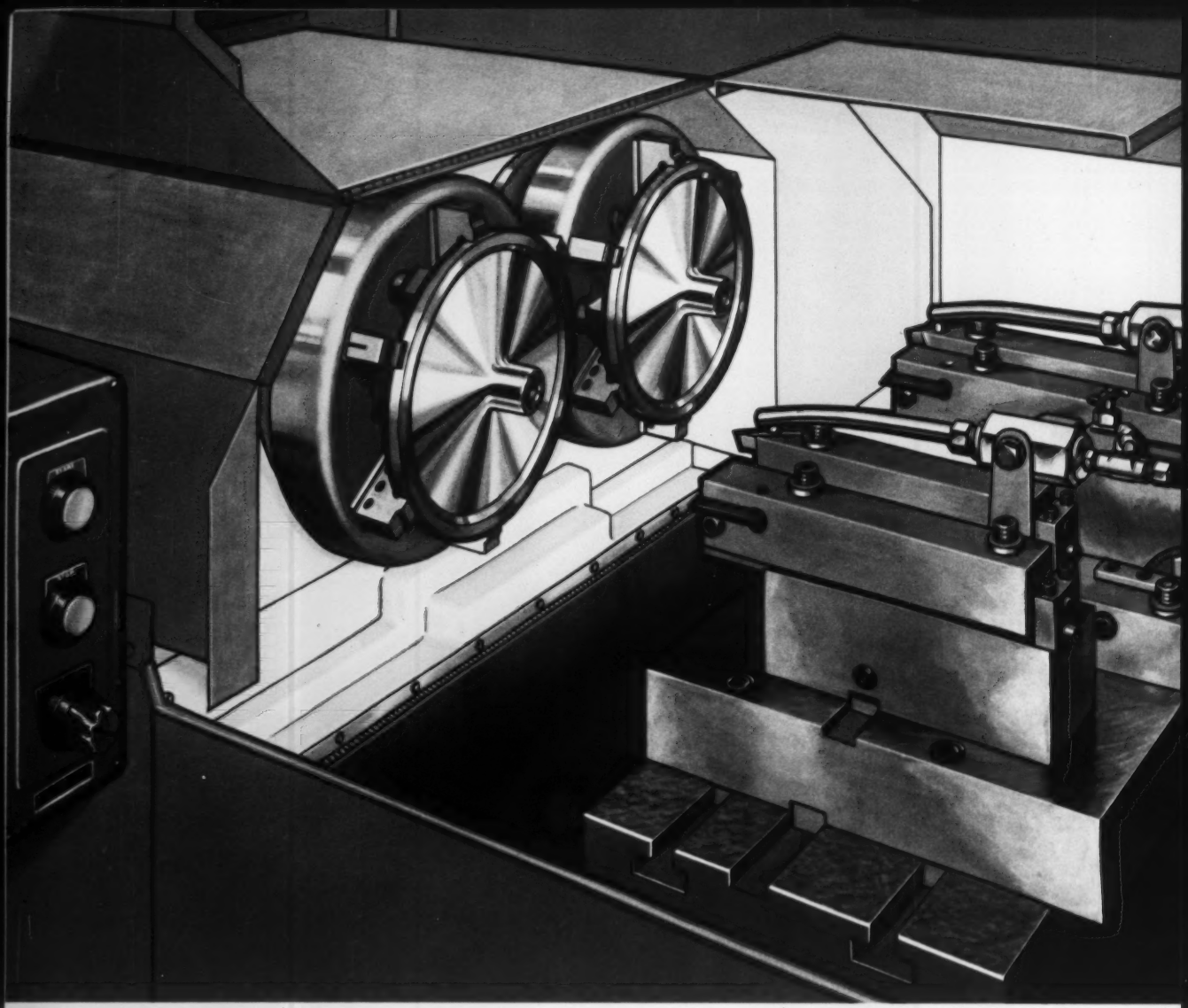
Odd shapes no problem
on New Britain Chuckers



The peculiar problems presented by odd shaped pieces are frequently as varied as the pieces themselves. The cut may be simple enough but the how and wherefore of chucking and swinging the piece may be something else again. New Britain Chuckers can handle the widest possible range of pieces—even odd shaped work. Open-end design which allows wide open accessibility to the tooling area makes the work easier to chuck, and easier to watch during the machining cycle. Because the work area is more open, this kind of work is easier to swing on a New Britain. This is one of many extras that are built into New Britain Chuckers. Another basic New Britain difference that pays off handsomely is the exclusive forming arm design which allows for the greatest possible variety of side cuts without special set-up. The combinations of end-working and forming cuts possible are practically unlimited. This flexibility of tooling coupled with big capacity lets New Britain users perform the widest possible variety of chucking machine work. Why not call in your New Britain representative?

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division • New Britain, Connecticut



New Britain cam actuated *boring and contour turning*

Extreme accuracy, high productivity—even on complex contoured surfaces—these are the areas where New Britain's Vertical and Horizontal Precision Contour Turning and Boring Machines take the kinks out of production. Tool slides are cam actuated, generating contoured and straight surfaces, including sharp corners and exact radii. Time consuming wheel forming and dressing required by some methods of producing close tolerance, fine finish work are eliminated.

This is basic with New Britain and is a good part of the reason for the unbeatable repetitive accuracy of these machines. Both verticals and horizontals are simple to operate and simple in operating principle. Normally, gaging one dimension is sufficient. From one to four high speed spindles can be mounted on a single machine.

The widely accepted horizontals, or the completely new and revolutionary verticals with exclusive cam-in-head design, can be seen in action simply by contacting your New Britain representative. Whether you require one machine, several machines, the best approach to a building-block set-up, or whatever your precision contour turning or boring requirement may be, check with New Britain before you decide.

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division ◆ New Britain, Connecticut

Here's a man who's ready to help you with a roll problem

But you don't need to have a roll problem to have a visit from Bill Curran, General Manager at National Roll. To the contrary, the "boss" spends a lot of his time with customers discussing their operations and roll requirements before problems have an opportunity to develop. This is typical of the personal interest National takes in helping customers get the benefits of maximum roll performance. For personal attention to *your* roll requirements, whether steel, iron or nodular iron, order from National. You'll see why . . . NATIONAL'S THE GROWING NAME IN ROLLS.

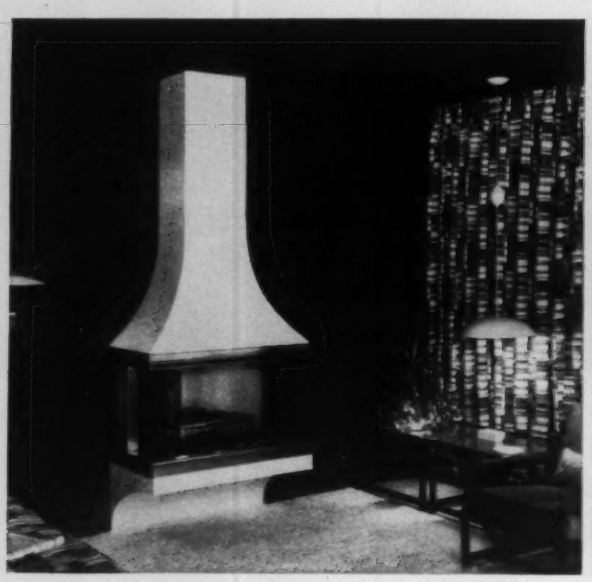
NATIONAL ROLL & FOUNDRY DIVISION
GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania
General Steel Industries, Inc., General Offices: Granite City, Ill. Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.
Subsidiary: St. Louis Car Company, St. Louis, Mo.

Want a sales edge in the market?

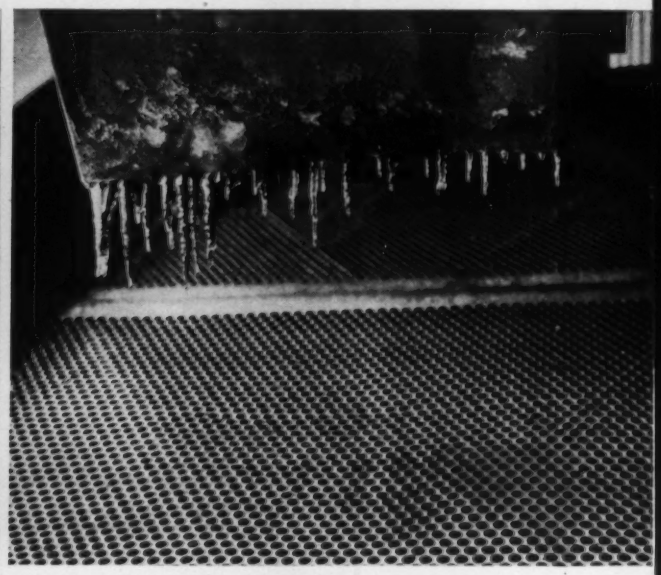
Durability and Stainless Steel enjoy an association that started years ago. In fact, some of the earlier applications of Stainless Steel are still around today, shining examples of real durability. This is a key point: the products are still serving today, and the *primary* point is that the people who purchased them are satisfied.

To provide the market with a product that satisfies is simply good business. It is in this vital product planning area where Stainless Steel can deliver the edge. It will hold up. It provides durability. It is strong, attractive, corrosion resistant.

The decision to swing to Stainless Steel takes measured judgment. It is not an impulse item. It costs more than ordinary materials, but to repeat a cliché, "First cost isn't everything." After all, an



Stainless brightens your home . . . This gleaming Stainless fireplace will last for the lifetime of the home it graces. It will *keep* its gleam, too, because Stainless doesn't corrode and it can be wiped clean with a damp cloth. This maintenance-free fireplace by Vega Industries, Inc., Syracuse, New York, can be installed in less than one day, in any room in the house, whether the home is new or old. Because of its Stainless Steel construction, installation costs are cut as much as fifty per cent.



Stainless Steel works in the coal mine . . . Coal screens, where coal is graded or cleaned, take a daily battering. They are subject to strong acids and water. If they are Stainless, there's no problem. Strong Stainless stands up to rough handling, and its superior corrosion resistance eliminates one of mining's biggest headaches. Stainless Steel screens last many times longer than screens of other materials, making it one of the industry's best investments.

Order Stainless Steel from your nearest Steel Service Center.

Get it with durable USS Stainless Steel

improved product, durability and possibly more market satisfaction deserve consideration. If you feel inclined to learn more about the proper grade of Stainless Steel for your products, write, wire or phone. There is an opportunity in the market today for the durability that Stainless Steel can deliver. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

Ever hear of a Stainless trailer wearing out? Nobody ever did. Are they durable? Once a Stainless Steel trailer loaded with lamp black caught fire. Cargo and tires burned up. But not the Stainless Steel. They put new running gears on it and it was as good as new. Since Stainless is so strong, this Fruehauf Trailer is lighter and can carry bigger payloads. Since Stainless resists corrosion, painting is unnecessary, and corrosive road salts or harsh industrial atmospheres are never a problem.

. . . and in the ice cream parlor. If you want your restaurant equipment to be attractive as well as long-lasting, make sure it's Stainless. Here is an all-steel unit that includes an ice cabinet, walk-in cooler, beverage dispensers and syrup rail. Its gleaming Stainless front is easy to keep sanitary. Cleaning agents won't harm it and it will *stay* bright and shiny. All the best restaurants (and home kitchens as well) use Stainless Steel for long life, cleaning ease, attractive appearance. This all-steel unit was manufactured by Erickson Industries of River Falls, Wisconsin.

Stainless welcomes your customers . . . This door is Stainless Steel. It creates a first impression that counts—sets off the business man who is proud of his firm. Stainless gives store fronts a quality look. Stainless keeps its good looks, too. The rainfall washes it clean. Stainless Steel's strength, attractive appearance and corrosion resistance make it ideal for outdoor locations. Stainless Steel doors are the *best* doors.

United States Steel USS

TRADEMARK

An automatic coiler forms .063 Johnson tinned music spring wire into an automobile brake cylinder spring. Because this spring will spend its life in a bath of corrosive brake fluid it needs a heavy, uniform tin plating that will not peel, crack or flake. It is a critical spring with 12½ coils, held to tight tolerances and coiled with two different end sizes. The larger end is 1.034 inches while the smaller end is .710 inch.

Mid-Continent Spring Company of Ky. says . . .

Dependable Johnson Music Spring Wire Gives Precision Springs Reliability

Dependable quality and quick service are two major reasons Johnson wire is specified in Kentucky spring plant

"After 23 years in the spring manufacturing business, I'll give you my one-word description of Johnson Steel & Wire Company's spring wire . . .

"It's DEPENDABLE."

So says L. B. Langhi, president of Mid-Continent Spring Company of Ky.

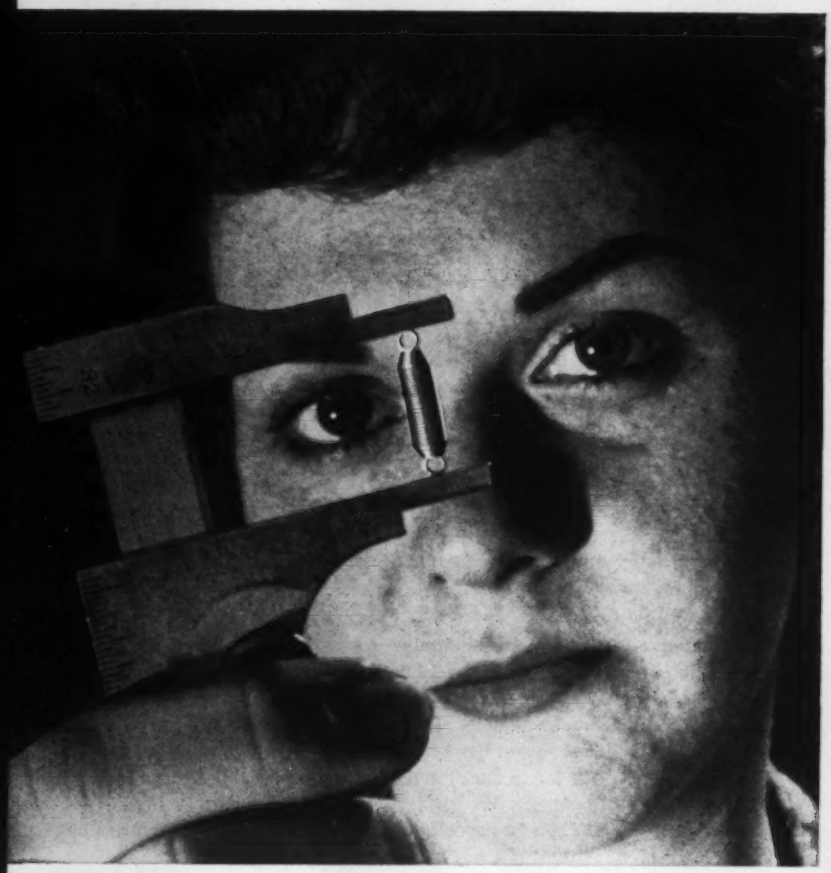
And that goes for Johnson's high carbon wire destined for springs that snap into action at the critical moment of a missile launching or simply make a baby doll wink, as Mr. Langhi explains.

Regardless of their job, it's vitally important to Mid-Continent's customers that springs function with precision. So the firm's plant at Hopkinsville, Ky., builds reliability into all its products, whether for space flights, toys, automotive and electrical parts or vending machines.

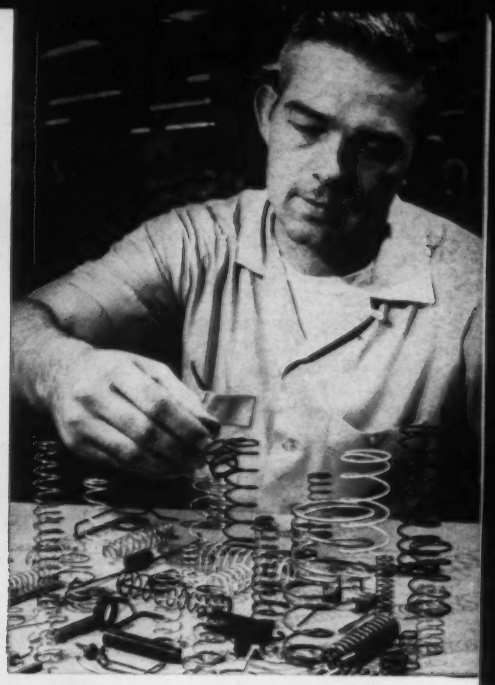
This reliability depends as much upon the raw materials of the springs —music spring wire or oil tempered spring wire—as it does upon the skills of Mid-Continent's spring makers.

Mr. Langhi said: "Because our customers depend upon our springs to give them a full measure of value, we demand and get wire from Johnson that has a uniform quality in finish, temper, size and physical properties.

"Coatings on Johnson tin-coated



A carburetor control extension spring must be held to unvarying tolerances to insure consistent performance. This important spring is made of Johnson .010 tinned music spring wire, has an O.D. of .118 inch and measures ¾ inch outside the loops.



R. M. Worthman, purchasing agent for Mid-Continent Spring examines some of the one thousand different type springs manufactured at Mid-Continent.

This tiny vending machine extension spring is made of Johnson .013 tinned music spring wire, has .158 I.D. and 22 turns.

music spring wire are both uniform and adherent. This eliminates peeling, cracking or flaking during our coiling operation."

High physical properties, uniform cast and smooth surfaces are other important requirements since Mid-Continent springs must form within strict dimensions and carry precise work loads.

At Mid-Continent, accuracy of wire dimensions greatly affects spring coiling and performance. Close tolerances on dimensions are met consistently in fine wire specialties produced by Johnson Steel & Wire Company.

"Our production averages over a million springs per day," said R. M. Worthman, purchasing agent for Mid-Continent Spring.

"Because of this, we keep our warehouse stocked with at least 300 tons of wire. Johnson supplies us with a range of .008-inch to .207-inch music spring wire and oil tempered wire.

"Whenever our wire stock begins to deplete, we're able to call for and get fast delivery service from Johnson's mill in Worcester or from its warehouses in Chicago or Akron.

"Of the 64 different types of brake drum springs we manufacture, 90 percent of them are made of Johnson wire. That's what we think of Johnson Steel's wire."

Let Johnson start today to help you with your high carbon spring wire needs.

Just call the nearest district sales office and talk with a Johnson representative. He's ready to help you with whatever your wire and spring problems might be—right now.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Akron	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

Steel

TO INSURE SUCCESSFUL PERFORMANCE

EVERY GRAMIX® PART IS

(PRODUCTS OF POWDER METALLURGY)

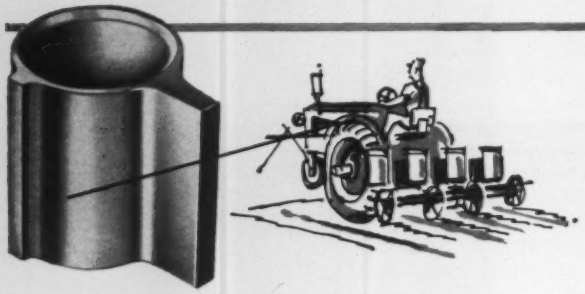
APPLICATION ENGINEERED

One of the most important factors to consider when purchasing powder metal parts is that of successful part performance; for a part to successfully perform its job, all of its physical and metallurgical characteristics must be suited to the application.

GRAMIX Products of Powder Metallurgy are always *Application Engineered,* which means product is specially matched to each specific application. From an almost unlimited variety of metal mixtures, one alloy is blended that contains the required properties and characteristics of the finished part; *all* aspects of part design and conditions under which it must operate are taken into account. Only then is the GRAMIX part produced.

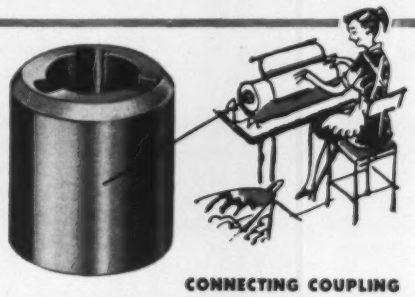
Eight of these *Application Engineered* GRAMIX parts are shown here. Each precisely suits the requirements of its job . . . each is the best part available for the job.

When you specify a GRAMIX part, you can always be sure that it has been *Application Engineered* for successful performance, long life and complete reliability. For more information on *Application Engineered* GRAMIX parts, write for Engineering Handbook G-55.



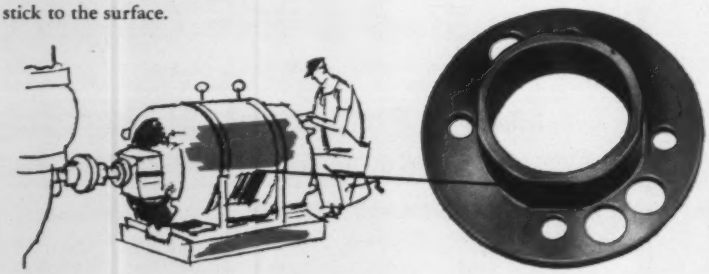
CORN SEEDER

GRAMIX was the material specified for this corn seeder part because the surface finish obtainable with the alloy used reduced the tendency of material to stick to the surface.



CONNECTING COUPLING

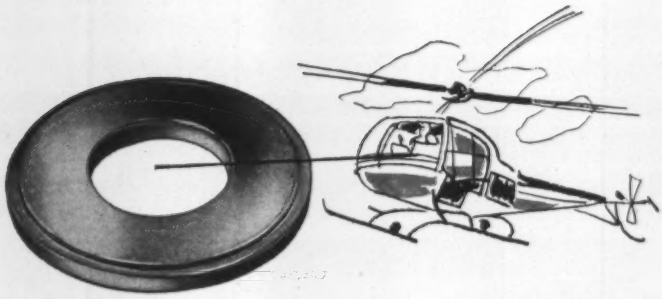
The connecting coupling employed in a small home ironer is formed from a special GRAMIX hardened steel alloy; it offers low wear and shock resistance.



CONTAINER COVER END CAP

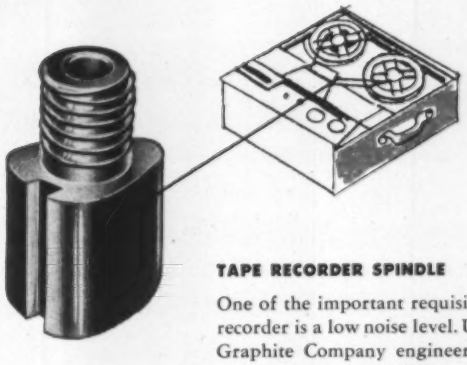
Great savings were realized when retainer caps for certain types of electric motors were made of GRAMIX.

This process made it simple and economical to mold the multiple holes to precise tolerances without extra operations.



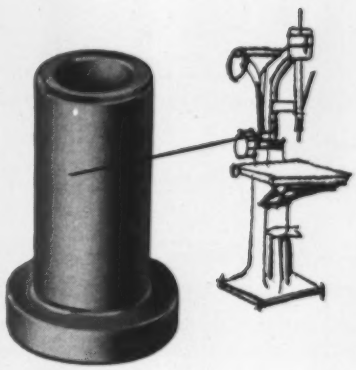
HELICOPTER THRUST WASHER

The outstanding features of the GRAMIX alloy specified for this thrust washer are a dependable and consistent friction and wear pattern as well as a fine surface finish.



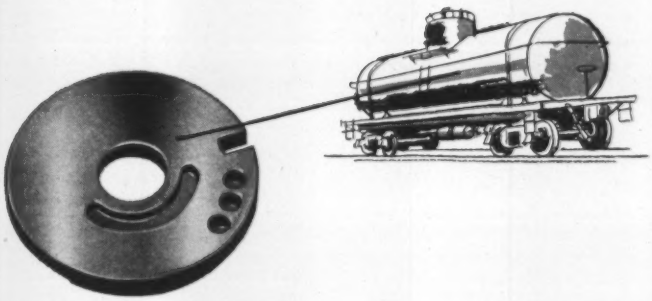
TAPE RECORDER SPINDLE

One of the important requisites in a tape recorder is a low noise level. United States Graphite Company engineers developed a special alloy to meet these requirements in the GRAMIX spindle.



GUIDE BEARING

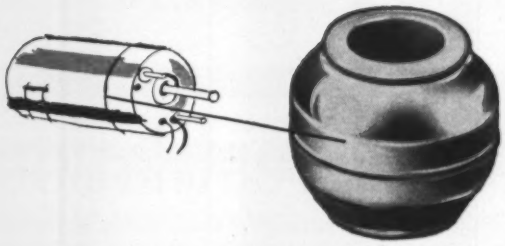
Built-in lubrication and low friction to reduce heat are important features of the GRAMIX alloy chosen for this guide bearing.



LIQUID PUMP END PLATE

This end plate is typical of many parts employed in liquid pumps of many types.

It is made from a wear resistant bronze alloy that was developed for pump applications.



FRACTIONAL H.P. MOTOR

The GRAMIX bearing for this Fractional h.p. motor was developed from a special low noise level alloy.

Its self-lubricating properties were also an important consideration in specifying GRAMIX.

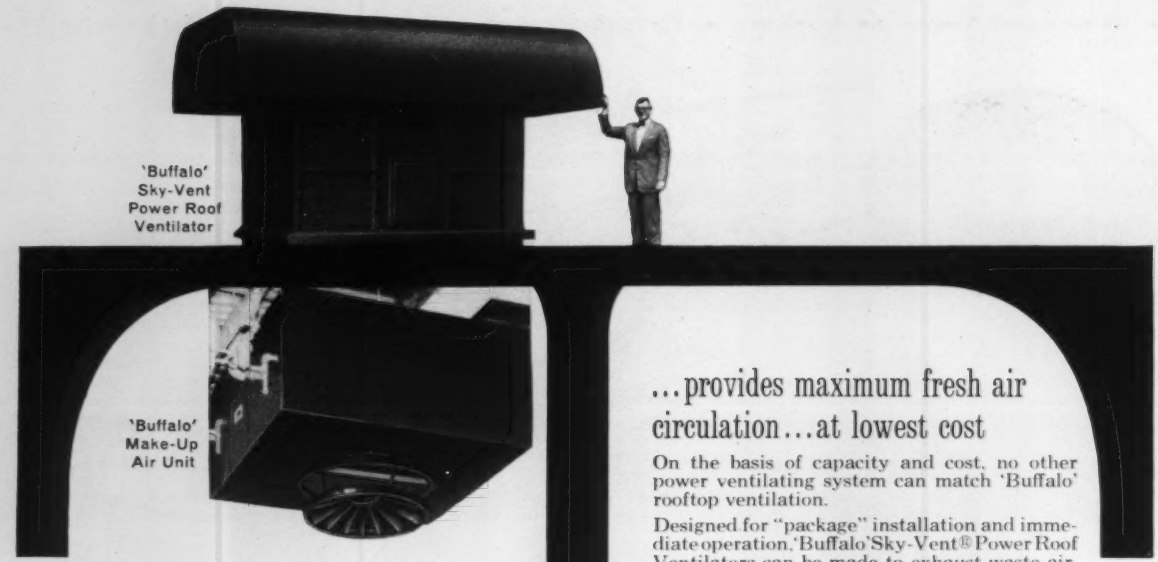
METAL POWDER mpi INDUSTRIES FEDERATION

X-296-2

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 18, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES



...provides maximum fresh air circulation...at lowest cost

On the basis of capacity and cost, no other power ventilating system can match 'Buffalo' rooftop ventilation.

Designed for "package" installation and immediate operation, 'Buffalo' Sky-Vent® Power Roof Ventilators can be made to exhaust waste air, or supply fresh air efficiently...in volume...*without ductwork of any kind.* Accessories such as filters, non-freeze heating coils, fresh and return air and face and bypass dampers can be supplied in stack of roof ventilator above roof level instead of in separate companion heater sections below roof level where desired.

Where extremely large amounts of air must be exchanged continuously, the tremendous air moving capacity of larger size 'Buffalo' units means that fewer units and roof openings are required...equipment and installation costs are held to an absolute minimum.

Available in 1000 through 250,000 cfm capacities with 12" through 120" wheels, 'Buffalo' Sky-Vents® ventilate entire plants...or sections of plants...with no interference to lighting, overhead handling systems or production line layout.

Rugged 'Buffalo' construction features tubular-braced hoods and stacks capable of withstanding the heaviest snow loads and hurricane force winds. All units are supplied with corrosion resistant coating.

'Buffalo' MAKE-UP AIR HEATER SECTION used under Style "H" Sky-Vent®. This high capacity heating and/or filtering unit for use with 'Buffalo' rooftop power ventilators...requires no ductwork. Available in any combination of fresh and return air dampers, face and bypass dampers, filters, non-freeze heating coils, or reverse design wheels for summer exhaust.

Your nearby resident 'Buffalo' representative has the complete story on these versatile ventilating packages. Give him a call, or write home office for Bulletin 2345.

'Buffalo' ROOF-TOP Ventilation

"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

It's more than a matter of taste

Wherever food and metal meet, in a processing plant or kitchen, the metal is usually stainless steel. The flavor *and* purity of food are entrusted to stainless because no other metal matches its resistance to contamination and corrosion. And none—metal or plastic—is so durable, decorative and easy to clean.

Such complete trust in a product comes only from time-tested performance—the reason J&L consistent quality stainless steel is specified by manufacturers of equipment widely used by packers and processors, and by chefs in restaurants, hospitals and hotels. By delivering quality consistently, J&L helps the food industry safeguard its products, all the way from plant to palate.

Get consistent quality stainless steel from your J&L distributor, who is backed by the full facilities of J&L's research laboratories.

Jones & Laughlin Steel Corporation

STAINLESS AND STRIP DIVISION • DETROIT 34

STAINLESS

SHEET • STRIP • BAR • WIRE

HOW TO SAVE MONEY ON COMPUTER CONTROL

You can also gain greater speed and far greater flexibility from a major advance in control computers.

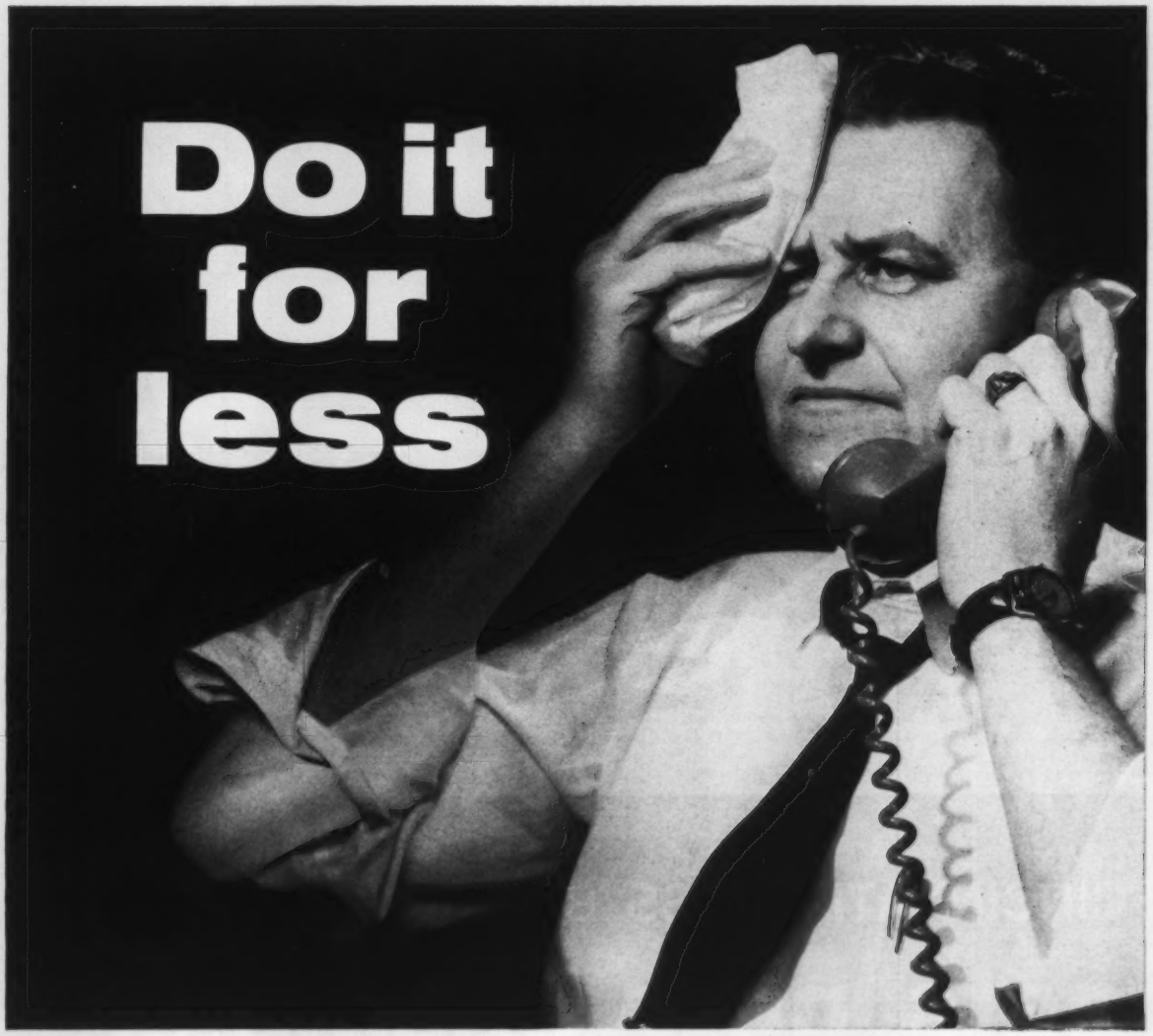
Stored Logic provides these benefits, and the TRW-530 is the first control computer with Stored Logic.

Stored Logic in the TRW-530 gives you economy in programming, economy in operating time, economy in memory requirements.

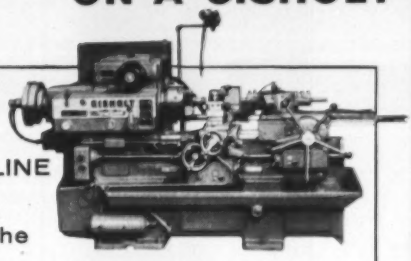
How can Stored Logic work for you? Our engineers will tell you why Stored Logic in the TRW-530 is the money-saving answer to control problems involving integrated control of several shops, mills, and furnaces. Contact one of our offices below.

TRW Computers Company
a division of
Thompson Ramo Wooldridge Inc.

LOS ANGELES 8433 FALLBROOK AVENUE, DIAMOND 6-6000, EXT. 2227 • **CHICAGO** 200 SOUTH MICHIGAN AVENUE, HARRISON 7-6348 • **HOUSTON** 1510 ESPERSON BUILDING, CAPITAL 7-5319 • **NEW YORK** 200 EAST 42ND STREET, MURRAY HILL 2-8488



ON A GISHOLT TURRET LATHE



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Things can get pretty hot in a job shop. Competition forces you to quote new machine rates. Yet, if you're average, over 60% of the ram type turret lathes in your shop are 10 years old. They're only half as efficient as today's models. It's easy to see how profits . . . and contracts can be lost.

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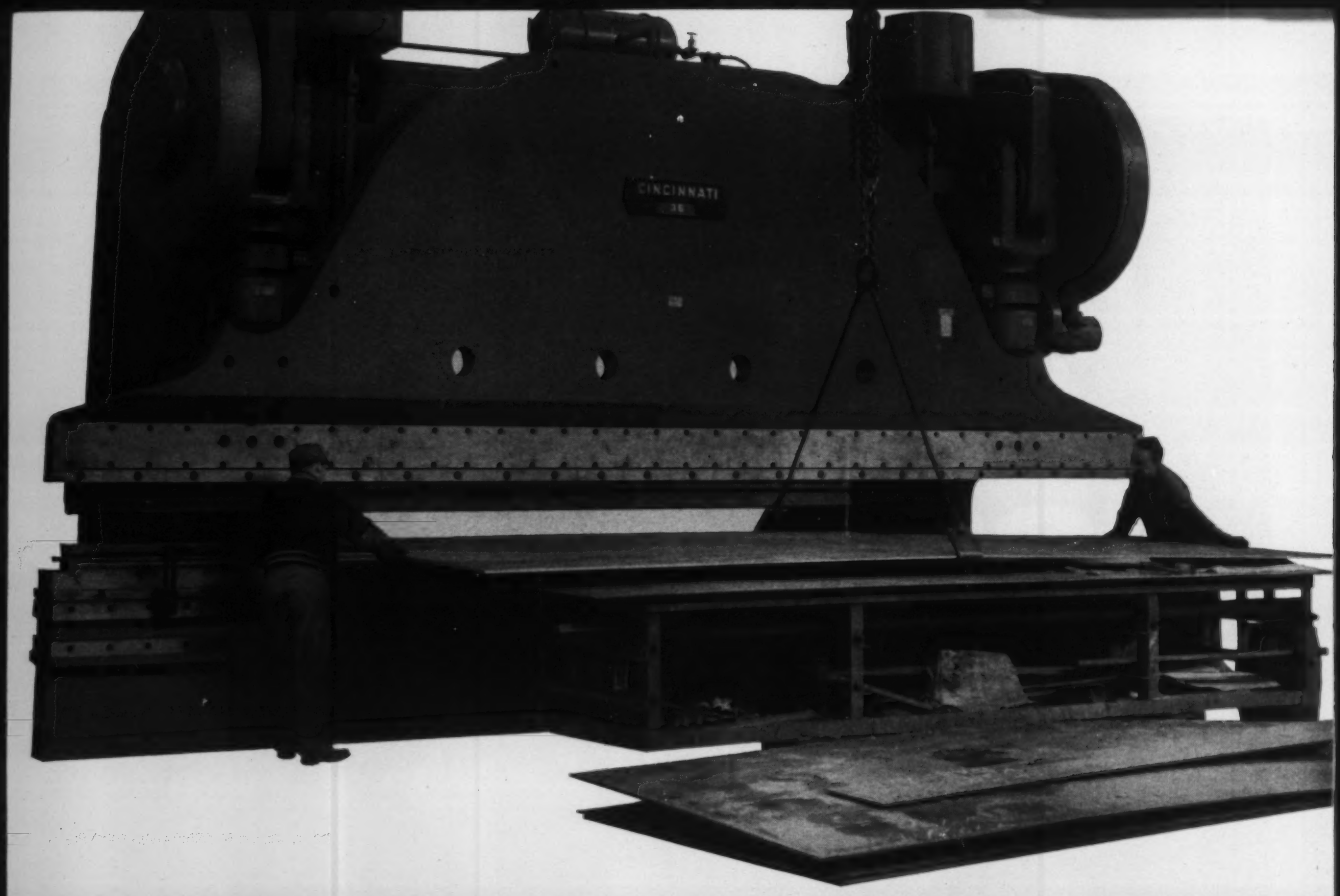

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This is another example of the way Cincinnati Press Brakes and Cincinnati Shears are reducing costs and opening up new business for shops across the country. If you don't have the new catalogs on these machines, both mechanical and hydraulic, please write for them.

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What Price Prosperity?

As measured by its gross national product, the U. S. will move on to new high levels of prosperity next year.

GNP is expected to rise $35 billion to $40 billion above 1961's and reach $555 billion to $560 billion in 1962.

You would expect all industry to benefit proportionately. But it won't. Steel and machine tools are excellent examples.

The steel industry is expected to make 105 million to 110 million tons of ingots in 1962 compared with about 97.5 million tons in 1961. So 1962 will be a better year for steel, but not its best. Back in 1955, when the GNP was only $498 billion, it made 117 million tons.

The industry has capacity to make at least 150 million tons of steel, perhaps as much as 175 million tons, which means that it will operate at a rate of 60 to 75 per cent in 1962.

Steel profits are squeezed by higher employment costs without compensating price increases. And the industry isn't getting relief on depreciation allowances to encourage the replacement of old equipment.

The machine tool outlook is pretty much the same. With anticipated domestic sales of $420 million and foreign sales of $190 million in 1962, the industry will have a 10 per cent better year than it did in 1961.

The industry can make $1.2 billion worth of machine tools annually, and were it not for its temporary influx of foreign business, it would operate at only 35 per cent of capacity in 1962.

The pace should be much faster. Two-thirds of our machine tools are obsolete, and their replacement represents billions of dollars in potential business. One big reason that business isn't materializing: Congress has failed to act on tax incentives.

To compete in world markets, companies in both industries have established foreign facilities, or they are in the process of doing so—in effect moving part of their capacities out of the country, even though steel and machine tools are vital to our peacetime prosperity and wartime defense.

Neither industry is asking for a handout, but government and labor should consider the measures needed to keep them strong and healthy.

Irwin H. Such

VICE PRESIDENT-EDITORIAL

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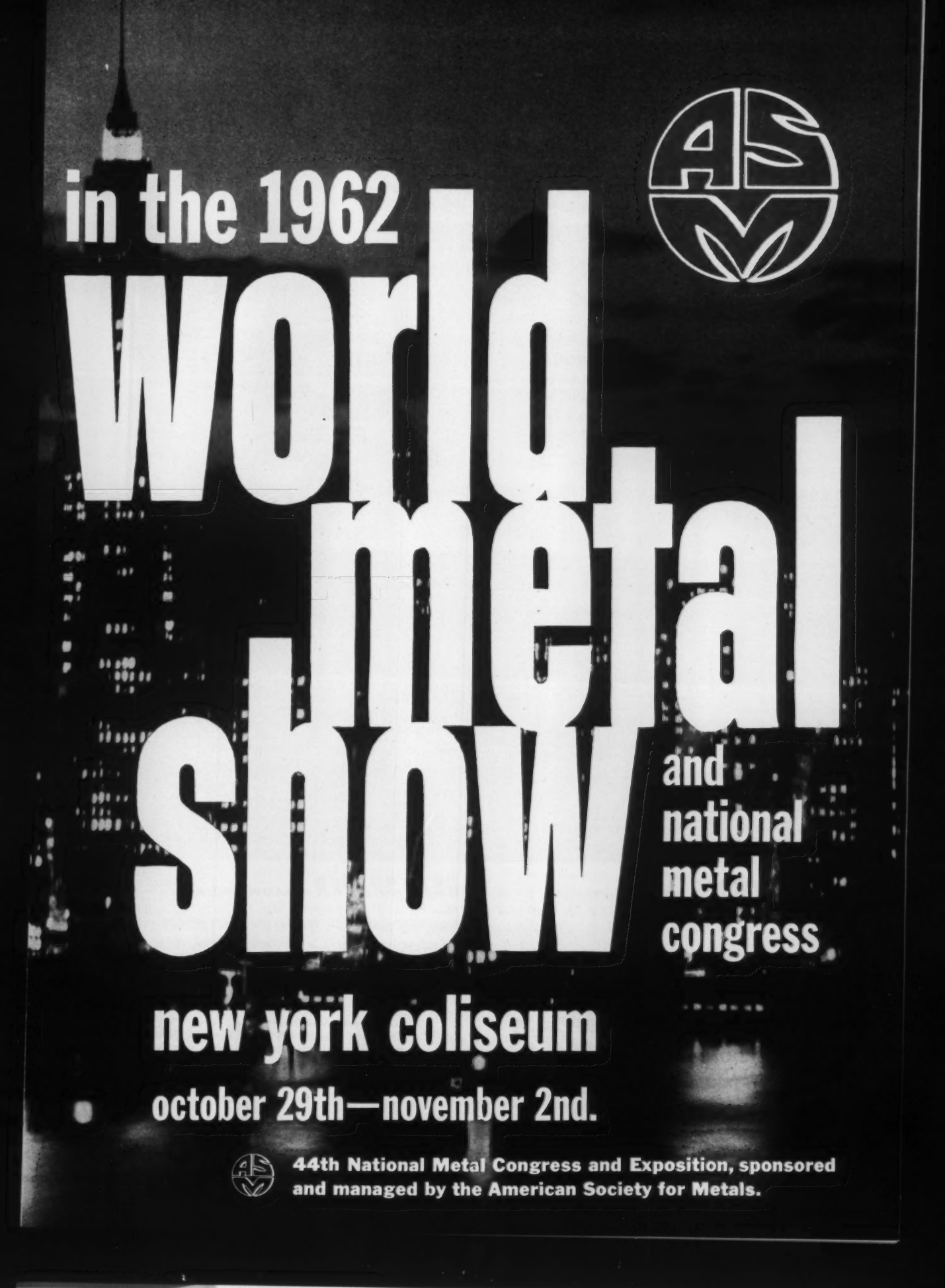
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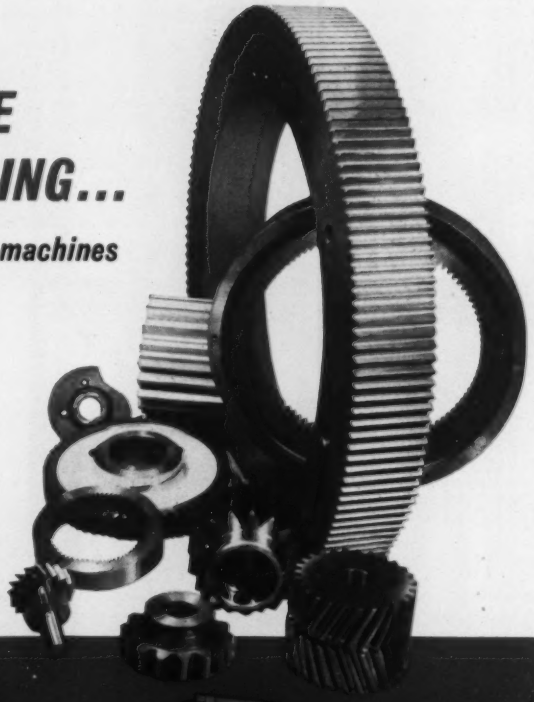

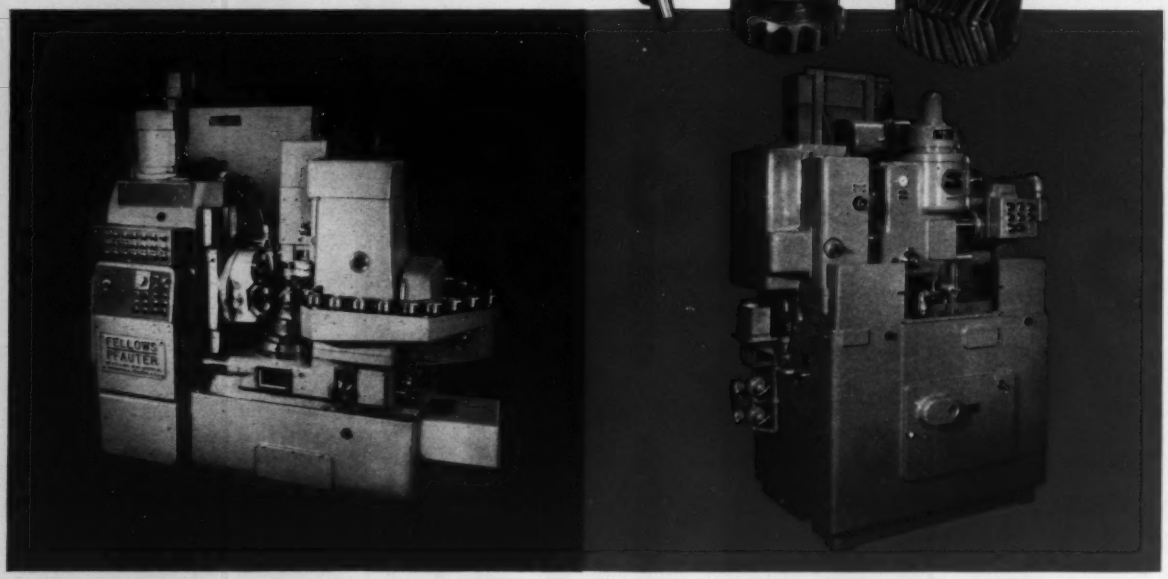

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"Protectionism finds strong support from industrialists who have forgotten how to compete."

A. J. Hayes, President, International Association of Machinists

"There will be both hardships and benefits from the administration's new trade policy."

Rudy Faupl, IAM International Representative

Unions Face Up to Import Problem

PROTECTIONISM — no! Liberal trade—yes, with reservations.

That was the official stand taken at last week's meeting of the International Association of Machinists in Washington. More than 250 delegates listened to their leaders generally endorse President Kennedy's liberal trade policies.

To some observers the meeting marked a milestone—the unions are beginning to face up to foreign competition. To others, it also signaled a warning: Now unions will come to the bargaining table with evidence to back up their thinking on foreign competition's impact.

On some of the issues, the union leaders indicated support for measures management has been fighting for—depreciation reform, for example. But management was also the target for some sharp attacks. In one, IAM President A. J. Hayes demanded that industry cut inflated salaries, bonuses, stock options, and expense accounts in the fight against foreign competition.

• **Goldberg Was Vague**—The delegates heard Labor Secretary Arthur Goldberg promise that the government would provide for those "who are most likely to lose their footing (workers and businesses alike) in the race for markets." Reportedly, the administration hasn't decided what "program for trade adjustment" it will follow.

It can expect these suggestions from labor:

• Additional supplementary unemployment compensation benefits—

up to two-thirds of weekly earnings for 52 weeks.

- More retraining for new job opportunities.
- Transportation to new jobs for families.
- More Small Business Administration loans.
- More technical information, market research, and other forms of advice to develop new products and new markets.
- Faster writeoffs on new equipment.

AFL - CIO President George Meany promised the Machinists that labor will not endorse liberal trade policies if the President doesn't come through with a trade adjustment program to aid communities, workers, and businesses affected by foreign competition. He wants the President to have the power to act immediately, bypassing time consuming Tariff Commission hearings.

Rudy Faupl, IAM International expert, proposed a concentrated effort by all labor unions to raise wages overseas. He argued: An increase in the wages of Japanese workers would even the competition between them and U. S. workers, raise the Japanese standard of living, and make that country a better market for U. S. exports.

• Tie Wages to Tariffs? — Mr. Faupl also advocated making better wage scales overseas an issue that the government should carry to the General Agreement on Tariffs & Trade sessions.

• Selling Job—It was readily apparent that there was less than unanimity among the delegates on how to combat the impact of foreign competition. Much depended on whose ox was being gored.

IAM President Hayes told the delegates: "We have jobs in 250 different industries, and exports are a prime source of jobs," so exports make up for some of the losses created by imports. The statement drew fire from a Riverdale, Md., delegate. He wanted to know: "What do I say to the men in my plant being laid off because of imports?"

Stanley Ruttenberg, research director for the AFL-CIO, told the Machinists that the threat of foreign competition could be met with increased productivity. Other speakers suggested that as productivity and technology advanced, labor could combat the problem best at the bargaining table.

Perhaps the size of the selling job the labor leaders face was best indicated by a New York delegate. He posed a question (Is foreign trade really a major concern of unions?) and gave this answer: "You couldn't get ten people to a meeting like this if we didn't have an unemployment problem."

New forming machine uses magnetism to provide . . .

50,000 psi Squeeze

PRESSURES up to 50,000 psi are magnetically exerted in a new forming machine introduced by General Atomic Div., General Dynamics Corp., San Diego, Calif.

Called Magneform, the machine forces metal into various shapes in 10 to 20 millionths of a second by collapsing, shrinking, or compressing it around objects like rope or coaxial cables. In one case, a metal band is collapsed around an electric motor assembly to hold it together.

No dies are needed, says General Atomic. Also, parts are never in contact with the forming coil, which eliminates scratching, marring, and surface damage. Interchangeable coils make the device versatile because pressures can be varied to fit unusual contours.

Screws Turn

WHEN the Justice Department ordered antitrust action against Ford Motor Co. because it had acquired Electric Autolite Co.'s battery and sparkplug properties, metalworkers asked: Is the Kennedy administration getting tougher on mergers and bigness?

The probable answer: Yes. Here are some of the indicators.

1. Atty. Gen. Robert F. Kennedy told the Economic Club of New York last month: "From May through September this year, the Antitrust Division has received 439 complaints of violations." Noteworthy too: Two-thirds of the complaints came from businessmen. Chided Mr. Kennedy: Industry can hardly blame the administration for being "antibusiness" when businessmen themselves initiate most of the complaints.

2. So far in 1961, 17 antitrust cases have been started vs. 11 in 1960, 10 in 1959, and only 17 in the 1955-58 period.

Rep. Emanuel Celler, (D., N. Y.), chairman, House Antitrust Subcommittee, expresses this sentiment: "There is little question that . . . the level of economic concentration is excessively high . . . the 150 largest firms in this country control about one-half of (our) productive capacity . . . one-tenth of 1 per cent of all corporations own more than 53 per cent of all corporate assets."

4. It's a good bet that next year the administration will seek Congressional passage of measures requiring prior notification of mergers, authorizing the Federal Trade Commission to seek preliminary court injunctions against mergers of questionable legality, and giving the Justice Department the right to subpoena documents from companies if such evidence is to be used in civil antitrust investigations.

Reason for all the concern is obvious: More firms are looking at the merger and acquisition routes

Tighter on Mergers and Bigness

for solutions to problems ranging from the financial to the marketing facets of business. A record merger year is in the making. Willard F. Mueller, director, FTC's Bureau of Economics, says 872 acquisitions were recorded in the first nine months of the year vs. 776 a year ago. Mining and manufacturing mergers haven't run so high since the 1925-30 period.

• **What's the Law?** — Antimerger cases are filed under the Sherman Antitrust Act and Clayton Act, which was amended by the Celler-Kefauver Antimerger Act of 1950. The law reads: ". . . no corporation engaged in commerce shall acquire, directly or indirectly, the whole or any part of . . . the assets of another corporation engaged also in commerce, where in any line of commerce in any section of the country the effect of such acquisition may be substantially to lessen competition, or tend to create a monopoly . . ."

At the Justice Department, Lee Loevinger, assistant attorney general, Antitrust Division, told STEEL that he is trying to systematize antitrust operations, including the concentration of cases involving industries or companies. For example: One man is in charge of the five General Motors Corp. cases. In any given month, Mr. Loevinger says he looks over about 100 merger cases.

His comments on the problem of organizing industry for the space communications satellite program give insight to his view on mergers generally: "I believe that the degree of concentration in (aerospace-electronics) may well be one of the reasons why America is not farther advanced in the field than it is."

• **FTC's Attitude**—Paul Rand Dixon (see cover), commissioner, Federal Trade Commission, views the Clayton Act as "simply meaning that we are not getting growth when we take something out of the competitive stream." He qualifies that though, however, with such possible exceptions as the failing company or the joining of two small companies.

Commissioner Dixon warns that the act is intended to apply to the conglomerate merger (where companies of entirely different product lines unite), as well as to the vertical type (a firm buys a supplier or customer) and horizontal type (you buy your competitor). No true conglomerate merger has yet been tested in the courts, but Mr. Dixon comments that "loss of economic freedom" becomes obvious when one firm controls 10 per cent of the gross national product. The question is: At what point does "loss of economic freedom" start?

• **Supreme Court's Role** — The courts will have much to do with determining the administration's future activity in the antimerger field. At stake is a definition of a "line of commerce" and the defense that merging with a firm about to go bankrupt cannot be regarded as tending to create monopoly or lessen competition. The failing company doctrine will be tested in the Supreme Court's review of the acquisition of Herring-Hall-Marvin Safe Co. by Diebold Inc.

• **Guidelines Fuzzy** — Industry's guidelines as to what's legal and what's not are still elusive. Says William T. Gossett, Ford vice president-general counsel: "Before the Electric Autolite transaction, Ford did not make batteries or sparkplugs—its leading competitor makes both. Ford received a written opinion from an outside counsel saying the transaction would not lessen competition or tend to create a monopoly."

And observers are wondering about another development. The antitrust action came the day before Philco Corp. stockholders voted to merge that firm with Ford, putting the automaker into the appliance business too.

Machinery Makers Lead Metalworking's Merger Parade

	1955	1956	1957	1958	1959	1960	Totals
Mining	34	35	31	39	29	17	185
Primary Metals	40	23	32	22	37	19	173
Fabricated Metals	45	27	46	34	50	41	243
Nonelectrical Machinery	79	79	56	59	76	61	410
Electrical Machinery	45	39	40	40	60	92	316
Transportation Equipment	39	46	25	38	47	47	242
Instruments	12	14	16	21	30	17	110
TOTALS	294	263	246	253	329	294	1679

Source: Federal Trade Commission (data limited to actions reported by Moody's Investors Service and Standard & Poor's Corp.).

AC Spark Plug's K. M. Tebo warns managers of impending bottlenecks as . . .

PERT Averts Potential Problems

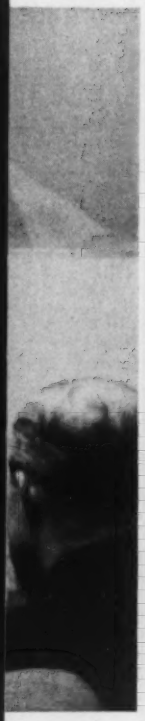
"THE MANAGER today wants to know—and should demand to know—his problems in ample time to be able to do something about them," states Kenneth M. Tebo, director, management control and analysis, AC Spark Plug Div., Milwaukee, General Motors Corp.

A new tool to help the manager spot problems ahead of time is gaining acceptance. It's called Program Evaluation and Review Technique (PERT). Mr. Tebo calls it "a system that is designed to prevent coming up to deadline dates without knowing that problems exist and 'yellow-flags' problems sufficiently in advance to let you do something about them."

Metalworkers involved in military work as prime contractors or subcontractors are finding that PERT is becoming mandatory on more and more programs. Ever since PERT began shaving more than two years off the Polaris program, it has been highly regarded by the armed services and their contractors. Typical praise: "In one instance, a pitfall in the Bomarc program which could have meant a delay of 140 days, was detected well in advance and averted," says Boeing Co., Seattle.

In nonmilitary work, PERT is being used or considered by many firms. Some of its applications are listed at the top of the opposite page.

• **Find the Critical Path**—PERT is based on a flow chart that depicts all the jobs and events comprising a project, arranging them in logical sequence. Represented as circles on a chart, the events are linked with arrows to show which jobs must be completed before others can be started or completed. Within each network there is a critical path—a chain of interdependent events from the start to the completion of the project which will require more time than any other sequence. If an event in the critical path is delayed, the entire project will be delayed. Example: A week's delay in production of ball bearings might result in a month's delay in assembling a guidance system and subsequently cause the test firing of a missile to be held up three months waiting for launching facilities. Similarly, a project can be accelerated



PERT Offers Benefits . . . in Applications Like These

Makes bids more competitive
Aids planning and scheduling
Documents plans
Aids communications
Co-ordinates activities
Displays progress
Predicts probability of meeting deadlines
Identifies trouble spots ahead of time
Shows relative importance of problems
Evaluates cost-time tradeoffs
Pinpoints responsibility
Refines thinking

Bids and proposals
Research and development
Launching new products
Model changeover
Plant construction
Installation of equipment
Production control
Cost and reliability control
Maintenance
Shipping
Manpower leveling
Evaluation of paper and data flow
Scheduling of accounting closings
Planning of computer installation
Co-ordinating advertising drives

by shortening the time taken to complete those activities along the critical path. To place them on an accelerated schedule, resources may be borrowed from other activities which have slack time and may be delayed without affecting the entire project.

To construct a PERT network, key personnel from all operating departments involved must list all the events included in a project. They must determine the logical sequence in which the jobs should be completed. Then they must estimate the time which will be required to complete the jobs. Since it is often difficult to estimate accurately how long a certain task will take, PERT employs three time estimates—"optimistic, pessimistic, and most likely" —in calculating an "expected time" of completion.

Another technique closely akin to PERT is the Critical Path Method (CPM) which differs primarily in the use of only one time estimate. It is best applicable in construction, production, or other projects where component jobs are less difficult to estimate in terms of time than are activities involved in research and development projects.

• **Built-in Foresight**—Once the network is established, progress information must be fed to it so that the status of the entire project may be determined and responsibility for delays will be pinpointed. Reporting into the system is generally done every two weeks. When PERT points out a trouble spot, it also stands by to find the best solution. Before corrective action is taken to avoid a delay, its effectiveness can be measured by simulating the change in the network.

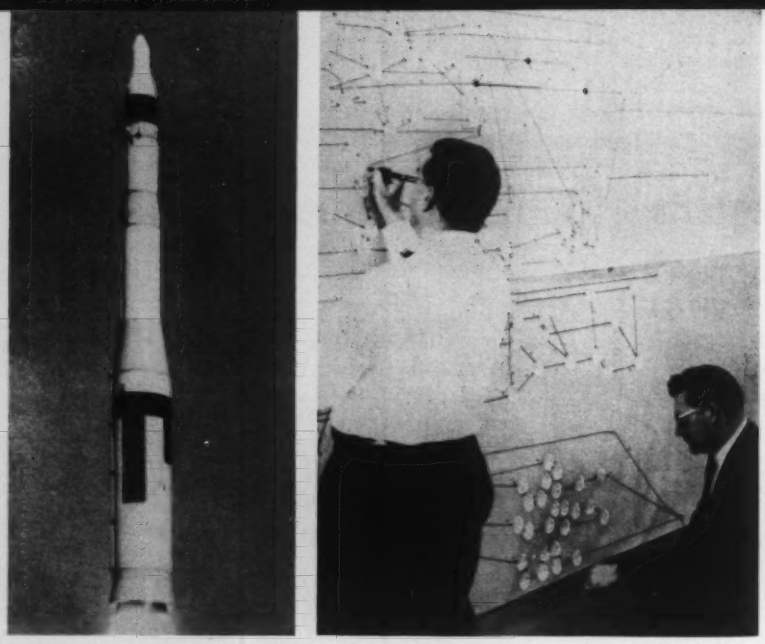
• **Growing Use** — Today "nearly two dozen U. S. aerospace projects are using PERT," says Booz, Allen & Hamilton, consulting firm which worked with the Navy to develop PERT for the Polaris program. Says the firm: "Nearly half of the 100 largest U. S. defense prime contractors are using the PERT technique. At least 70 per cent of the 75 R&D firms with the largest government contracts are using PERT."

Defense Department sources say the Army, Navy, and Air Force are using PERT in some of their major contracts and will soon require that PERT be used on all major programs. The National Aeronautics & Space Administration, another potentially big PERT user, is applying the technique to the Apollo program.

The armed services have found PERT to be a vital tool in co-ordinating complex projects within tight deadlines. Even on projects where PERT is not mandatory, bids which are PERTed give the contractor an advantage because he can present a clear picture of his plans and demonstrate their feasibility.

• **Nonmilitary Applications**—"PERT is ideal for the new and untried, infrequently repeated work, where schedule and cost control are critical," says C. Wilson Randle, partner, Booz, Allen & Hamilton. He points out that even in a continuous operation, PERT can be used at an interval such as a change of product or introduction of a new model. It may also be used for starting a production line, introducing new products, shutting down and restarting a plant.

International Business Machines Corp., New York, estimates that well over 1000 companies are using some form of PERT. More than 30 computer programs are available for



All aspects of the Minuteman program will be included in a PERT system being designed for the Air Force by Operations Research Inc. The system will include: Development and production of the weapon, transportation, construction of missile sites, and indoctrination and training of personnel. ORI personnel (right) are constructing a PERT network, plotting the many activities and events which comprise a project

PERT users. A. J. Roden-Reynolds, vice president, Mauchly Associates Ltd., Toronto, Ont., consulting firm, says, "Already some 500 organizations in Canada and the U. S. are actively engaged in applying the Critical Path Method to their scheduling problems."

Outside the Defense Department's programs, PERT has spread fastest into the construction field—often as the CPM. But applications in other areas are being tried by many firms. Booz, Allen & Hamilton has found, for instance, that "of 71 major companies using PERT on military projects, 32 have carried its use over to nonmilitary applications."

In its Milwaukee operations, AC Spark Plug started using PERT on its bomber navigation system in April and is applying the technique to the development of two commercial mobile radio-telephone systems. It has also started the practice of reviewing each new program to determine the advisability of PERTing it.

Interest in applying PERT to new product development and introduction is growing. Says Donald Malcolm, vice president, Operations Research Inc., Silver Spring, Md., consulting firm: "The companies that are involved in this confidently express the fact that they believe they can cut the cost of the development of new products by at least 20 per cent, both in time and cost, due to better co-ordination between the functional areas of the company early in the game, on a planned basis, where everybody knows what their function is to be."

• **Forced Thinking**—One of the prime advantages of the PERT system is the graphic presentation of an entire project so that managers can see how their jobs fit into the total picture. It also insures that no job is overlooked in the planning stage.

Says Dr. R. L. Martino, vice president, Mauchly Associates Ltd., "Drawing up a network diagram forces the project manager to go into more detail than he is ordinarily used to." Mr. Tebo adds: "If we got nothing more out of the PERT system than organized and directed planning, application of the system itself would be well worthwhile. It forces thinking—it serves as a strong medium for communications."

• **Learning More About PERT**—There are many opportunities to learn the mechanics of PERT. Seminars are offered by consulting firms and various associations such as Operations Research Inc. and the American Management Association, New York. Military agencies also provide instruction for contractors as do some of the larger firms for their subcontractors. Mauchly Associates Ltd. presents two and five day courses on the Critical Path Method under the sponsorship of the Materials Management Institute and the Industrial Education Institute.

• **Organization** — M. O. Alsager, Milwaukee, director, management control operations, AC Spark Plug, emphasizes that fitting PERT into a firm's organization begins with top management's appreciation of its advantages. Such a person is A. A. Hendrix, the firm's Milwaukee manager, who initiated the system's use at AC. Since then, PERT has been selling itself to the operating personnel on whom it depends for accurate information and implementation of its advice.

Most of the experts agree that the PERT program should be headed by one person who will act as an adviser to the project manager in a staff capacity. At AC Spark Plug, Mr. Tebo acts in this capacity, overseeing the input of information into the system and briefing managers on project status. His analysis includes: Discussion of the problems and their effect on the program and action required to keep the project on schedule.

• **What's Ahead?**—Although PERT has already demonstrated its effectiveness as a planning and scheduling tool, efforts are being made to expand the technique's capabilities and broaden its applications. An idea of what's ahead is given by AC Spark Plug's H. S. Phelps, who is engaged in the development of more advanced management techniques:

"We are aiming toward a total integration of costs, manpower, resources, the effects of schedule compression on costs and performance, production status, and business forecasting."

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

More U. S. Firms Are Going Overseas

NEW OVERSEAS activities of U. S. companies increased during the first half of this year. A study by Booz, Allen & Hamilton shows that 18.5 per cent more new ventures were undertaken during the first six months of 1961 than during the last six months of 1960.

● **By Industry**—Chemical companies are leading the way, the survey shows (see table at right). Metal-working industries (boldfaced in table) are among the most active. Earlier studies based on direct foreign investment in business properties found mining and petroleum firms to be far and away the most active overseas investors. Manufacturing firms are setting the pace now. The important implication: U. S. businessmen are no longer just extracting the natural resources of overseas nations. They are rapidly building plants to make and market finished goods abroad—providing jobs, tax income, better markets in foreign lands.

● **By Area**—Europe—especially the European Common Market—is the most favored area for investment, the Booz, A&H study shows. Before 1960, Canada and Latin America had obtained the greater part of U. S. capital. Now Europe and, to an increasing extent, Asia are the sites for foreign investment of U. S. dollars.

● **By Size**—The foreign venture is not the exclusive province of the industrial giants. The Booz, A&H study finds that nearly 30 per cent of the foreign business activities during the last year were made by firms with annual sales of $50 million or less. But about half of the overseas activities were still accounted for by 255 companies that are among the nation's 500 largest firms.

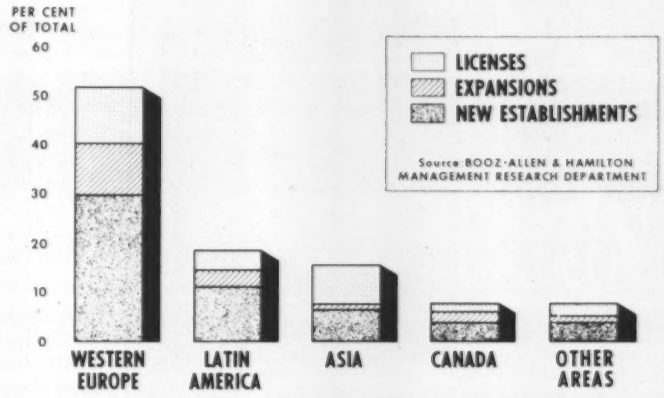
● **By Type of Venture**—More than half the activities reported by Booz, A&H were new overseas operations; 453 firms established 653 new foreign business units. Of those, 71 per cent were manufacturing establishments (vs. sales, administrative, or other types of functional units).

More than 40 per cent of the reported establishments are wholly owned subsidiaries; 36 per cent are jointly owned; nearly 20 per cent are wholly owned branches.

Licensing activity also increased its tempo; 41 per cent more agreements were reported during 1961's first half than in 1960's last half. Firms with annual sales of less than $50 million undertook 35 per cent of the agreements.

● **Totals**—The total value of private U. S. investments abroad passed the $50 billion mark at the end of last year.

Where They're Going . . .



(New foreign activity from July, 1960, through June, 1961)

. . . And Who's Going Now

Industry	New Establishments Mfg.	NonMfg.	Total	Expansions	Licenses	% of Total Activities
Chemicals, Allied Products	99	24	123	36	25	15.4%
Machinery, Except Electrical	**61**	**27**	**88**	**30**	**42**	**13.4%**
Electrical Machinery	**32**	**18**	**50**	**11**	**52**	**9.5%**
Food, Kindred Products	53	6	59	30	23	9.4%
Transportation Equipment	**33**	**12**	**45**	**12**	**53**	**9.2%**
Fabricated Metal Products	**30**	**8**	**38**	**5**	**21**	**5.4%**
Mining & Petroleum	24	14	38	14	7	4.9%
Textiles & Apparel	19	2	21	7	28	4.7%
Instruments	**23**	**6**	**29**	**9**	**7**	**3.8%**
Miscellaneous Manufacturing*	**17**	**5**	**22**	**10**	**14**	**3.8%**
Primary Metal Products	**21**	**5**	**26**	**7**	**9**	**3.5%**
Rubber & Plastic Products	15	2	17	12	9	3.2%
Paper & Allied Products	10	5	15	2	9	2.2%
Stone, Clay & Glass	3	1	4	7	12	1.9%
Lumber & Furniture	5	2	7	1	3	0.9%
Other	19	52	71	26	9	8.8%
TOTAL	464	189	653	219	323	100.0%

*Includes Ordnance.
Source: Booz, Allen & Hamilton.

(New foreign ventures during period of July, 1960, through June, 1961)

BDSA to Step Up Activities...Budget May Allow Expanded Submarine Fleet...Industries Report Walsh-Healey Action

He Brings New Look To BDSA

EUGENE P. FOLEY

LOOK FOR the Commerce Department's Business & Defense Services Administration to assume more responsibility for some of Secretary Luther Hodges' favorite programs. The duties of Thomas E. Drumm Jr., who resigned as BDSA administrator, have been assumed by Eugene P. Foley, deputy assistant secretary of commerce.

The shift is regarded as important because of Mr. Foley's background. He came to the Kennedy administration from the Senate Small Business Committee, where he was legal counsel; he has also worked for Sen. Hubert H. Humphrey (D., Minn.) as executive assistant.

Mr. Foley notes that more direct action can now be taken on BDSA programs. Some steps between him and the industry divisions have been eliminated. He also plans to tie business a little closer to the Commerce Department's interests, perhaps by reinstituting the WOC (without compensation) program —industry executives are invited to Washington to learn the ropes. Some people in the department think that the WOC program might be more valuable if men were brought to Washington for a six week period of orientation. During the Eisenhower administration, they served six months or longer. The proposed plan would give more men opportunities to participate.

BDSA will be carrying out new roles in some new programs being developed at Commerce. Here are examples:

Business-Government Relations — BDSA's industry-wide division setup gives it the capacity to appraise the effect of proposed programs of the administration on industry. State and Treasury Departments and the Council of Economic Advisers can use a bureau like BDSA as a sounding board.

Trade Adjustment—The President's campaign for a more liberal foreign trade policy is to be coupled with a "trade adjustment" program for aiding plants and workers harmed by foreign competition. It could be BDSA's job to monitor the project, perhaps even direct it.

Growth Opportunities—The many industry divisions of BDSA are being divided into three groups—Office of Industrial Equipment, Office of General Products & Services, and Office of Industrial Materials. Two new sections have been established: Office of Marketing Services and Office of Industrial Growth & Research. The regrouping is designed to get information about opportunities in new products and new markets to industry quicker. Other problems will be considered. Take trade adjustment: Where should unemployed workers relocate, or management relocate its new plant? How many workers should be retrained? What loans should be made to businesses hurt by imports?

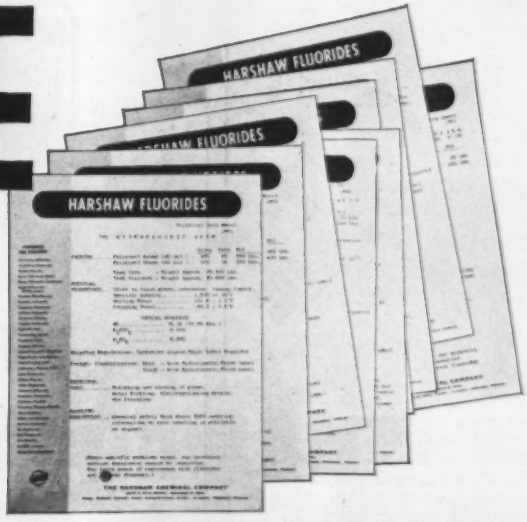
Credit Guarantees—Look for BDSA to play a role in a program highly regarded at Commerce: Government guaranteed loans for the purchase of tools. Up to 80 per cent of a purchase might be backed by the government with loans running to six or seven years.

● **NAVY SUB PROGRAM EXPANDING**—The new defense budget will probably include provisions for a 41 ship fleet of Polaris submarines. Present plans call for a 29 ship fleet. The additions would come over a two year period ending in 1967-68. Cost: More than $1.5 billion. The Navy is also examining its attack submarine fleet which includes deep diving, atomic powered types of the Thresher class. Cost: More than $50 million each. It's reported that their construction rate may be boosted from three to eight a year.

● **WALSH-HEALEY ACTIONS**—Two industries report on Labor Department efforts to establish new minimum wages for plants doing business with the government: The conveyor industry met with Wage & Hour Division people to study the survey which will be mailed to conveyor producers. It will go to plants which have ten or more employees in which conveyor production accounts for more than 50 per cent of total output.

Labor unions are asking for a $1.72 an hour minimum wage for the electronic equipment industry. The Electronic Industries Association argues that its survey shows a minimum higher than $1.40 an hour will harm small manufacturers and retard growth in some sections of the country, particularly New England. Another point: It would raise the cost of defense because so much of the industry's work is in that category.

FLUORIDE Data SHEETS



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- ☐ BORON TRIFLUORIDE COMPLEXES
- ☐ BROMINE PENTAFLUORIDE
- ☐ BROMINE TRIFLUORIDE
- ☐ CADMIUM FLUOBORATE SOLUTION
- ☐ CHLORINE TRIFLUORIDE
- ☐ CHROMIUM FLUORIDE
- ☐ COBALTIC FLUORIDE
- ☐ COPPER FLUOBORATE SOLUTION
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- ☐ FLUOTITANIC ACID 60%
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- ☐ HYDROFLUORIC ACID 70%
- ☐ HYDROFLUOSILICIC ACID 30%
- ☐ LEAD FLUOBORATE SOLUTION
- ☐ MANGANIC FLUORIDE
- ☐ MERCURIC FLUORIDE
- ☐ NICKEL FLUOBORATE SOLUTION
- ☐ POTASSIUM BIFLUORIDE
- ☐ POTASSIUM CHROMIUM FLUORIDE
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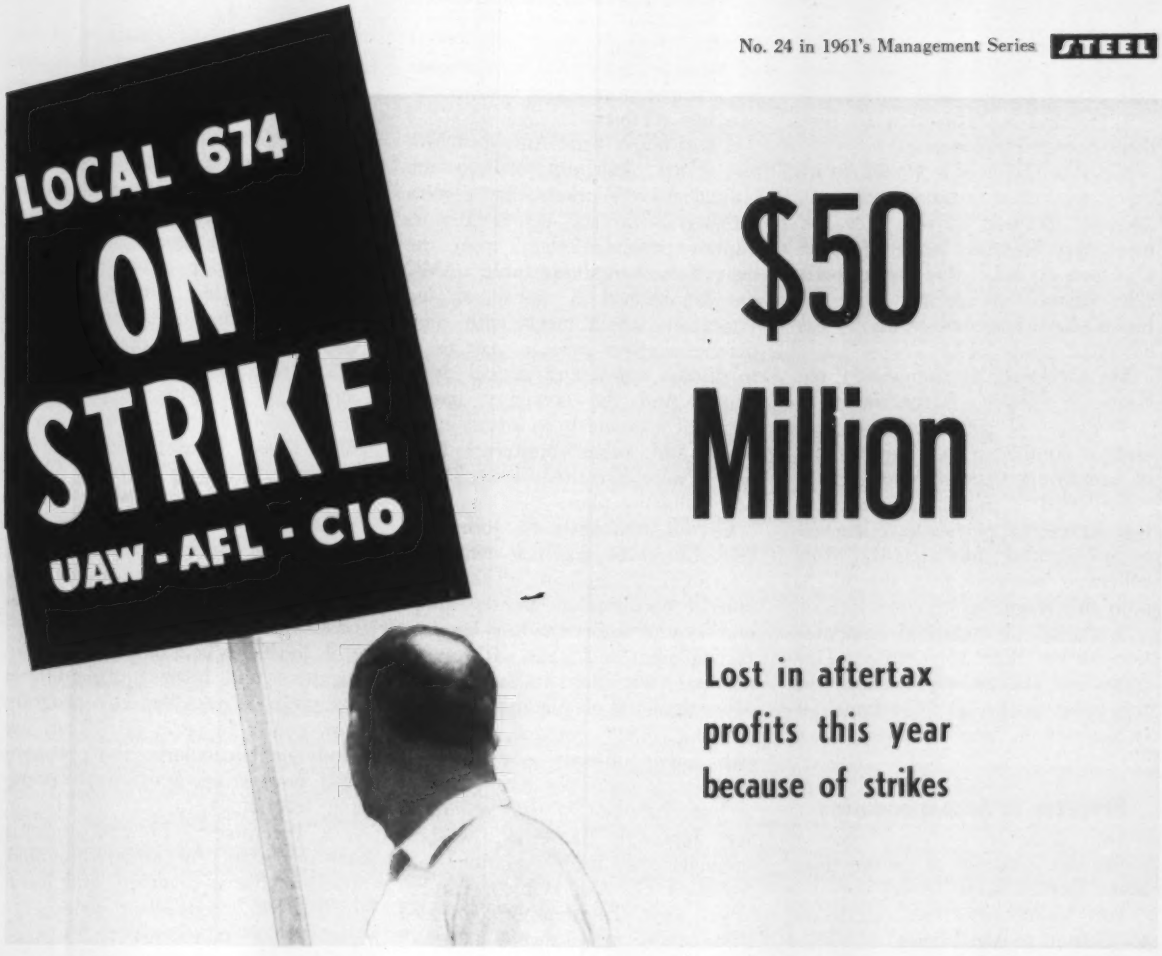


Work with Labor for Profit Growth

PROFIT GROWTH

ALTHOUGH the country's 1961 strike losses will be the lowest since World War II years . . .

- Nearly 15 million mandays won't be worked because of stoppages.
- Some $280 million in wages not paid to striking workers will be down the drain.
- About $840 million in sales won't be made by the companies struck.
- Almost $50 million in aftertax profits will be lost by the strike-hit firms.

That's the measurable cost of labor-management discord. If you could document the expense of slowdowns, featherbedding, and all the other byproducts of disharmony, the total would be much higher.

"We are gravely concerned about the future of collective bargaining," says Edward L. Cushman, vice president of American Motors Corp.

Lemuel R. Boulware, labor expert and retired vice president of General Electric Co., believes the collective bargaining situation "is worsening, not improving," despite the comparatively few work stoppages this year. He doesn't think the auto negotiations augur well.

"I am not satisfied with the way things have worked out in labor-management relations," says I. W. Abel, secretary-treasurer of the United Steelworkers.

"Rising discord between labor and management obscures the many areas where goals are compatible," says A. J. Hayes, president of the International Association of Machinists. "Management and labor have much more in common than in controversy."

What in Common?

Mr. Hayes states: "The best union man is also the most loyal to his employer. Conversely, the apathetic union member is also an apathetic employee. Loyalties are not mutually exclusive."

He sees at least three goals as compatible for both sides:

1. High wages (they make high

consumer spending possible).

2. Good working conditions (they help create a loyal work force).

3. Political sophistication (it furthers democratic processes).

Mr. Abel believes it would be in the interest of both labor and management to speed up the grievance machinery because "justice delayed is justice denied." He thinks both sides should co-operate more to lessen the impact of technological advances upon jobs.

Mr. Cushman distinguishes three stages in collective bargaining:

1. Period of power maneuvering and of conflict. It's characteristic of bargaining in its infancy.

2. Period of mutual accommodation where two parties have learned to live together, but uneasily. Most collective bargaining in the U. S. is in this stage.

3. Period of organized co-operation, rather than competition. Few companies and unions have reached this point in the U. S., although it is common in West Europe.

Progress in Accommodation

Are we close to a jump from Stage Two to Stage Three?

Few leaders on either side think so. Listen to Mr. Hayes:

"Individual relations between management and labor are, on the whole, quite good. But on an institutional level, the relations between Management (with a capital M) and Labor (with a capital L) are pretty bad."

"The union function should be as a catalyst, to prod decision making influences into action," believes Mr. Cushman. "If unions become institutionalized (as they are becoming), they lose their key function."

Mr. Hayes answers: The pressures against organized labor are speeding its institutionalization as a means of self-defense.

But evidence is mounting that more efforts toward accommodation are being made.

Whitehead & Kales Co., Detroit, and the United Steelworkers Local No. 2341 jointly sponsored an employee retraining program during a slack period. (The company makes auto carrier units and other structural fabrications.)

A larger company, Addressograph-Multigraph Corp., co-operated with its union in an unusual leadership seminar (see the accompanying exhibit).

A still larger firm, American Motors Corp., has proposed to the United Auto Workers that a joint conference be set up to discuss mutual problems away from the heat of the bargaining table. AMC has established a panel of ten clergymen which meets with company executives twice a year or so to discuss moral and ethical problems. And the company has a panel of economists to advise it on labor and other matters. Both panels were consulted about AMC's profit sharing plan.

On an area basis, St. John College, Cleveland, has just concluded a series of five seminars on the problem of encouraging greater co-operation and understanding between management and labor. It's one of the first such affairs in the country. More than 100 people attended each meeting. Two company executives, two union officials, and a priest spoke.

The chairman of the conference was James J. Bambrick, assistant manager of labor relations for Standard Oil Co. (Ohio). He believes that the seminars revealed three major areas where more co-operation would be possible:

1. Improving communications on some subjects, such as the meaning of new contracts.

2. Fighting foreign competition via union and industry sponsorship of "Buy American" and other campaigns. It's being done now in the hat and women's wear industries.

3. Speeding up grievance and arbitration procedures, via co-operation of both sides.

On an industry basis, 11 steel companies and the United Steelworkers are meeting for 30 months in an attempt to get understanding and agreement in six fields. While neither side claims any startling progress after more than 100 conclaves over 23 months, both point out that they have seven months to go.

Here's what six subcommittees have been doing:

1. **Seniority**: The two sides have studied practices in other industries. They have held informal hearings attended by local union officers and committeemen and local managers. They've examined local practices, how they grew up, what the problems are, and how the situations could be improved. They haven't reached any conclusions, but they have gathered a lot of evidence.

2. **Grievance and Arbitration**: The two parties are making a complete statistical study of backlogs and how they've grown. They're trying to decide: At what steps should settlements be made? At what steps shouldn't they be made?

3. **Medical Care**: They are concerned mainly with spiraling costs and have held many meetings with Blue Cross, Blue Shield, hospital groups, and doctors' groups. Questions like these are being asked: What steps are being taken to hold down costs? How is quality being improved? They are also giving consideration to alternative methods of providing medical care.

4. **Job Classifications**: Both management and labor representatives are taking a new look at a program now nearly 15 years old. They are studying, particularly, the problems that have arisen because of changing technology.

5. **Incentives**: They're studying the types of incentives provided, the breadth of coverage, and levels

E. F. Franz
Vice president, industrial relations
Addressograph-Multigraph Corp.

When Labor and Management Co-operate

Early this fall, the International Association of Machinists' Local 1228 held a leadership seminar for many of the 2000 Addressograph-Multigraph Corp. workers it represents. The conference was unusual in two respects:

1. A union local rarely sponsors such a comprehensive, professionally managed affair.

2. At the local's invitation, management provided speakers to give company viewpoints on grievance procedures and labor relations, unemployment and workmen's compensation, the medical program, pensions and insurance. The company participated in all but two sections—sessions on streamlining the local and financing the local.

Management probably would not have been invited as recently as 1959 when the company suffered a serious strike.

"When this unusual project was first proposed to us by the union, we enthusiastically endorsed it," recalls E. F. Franz, vice president, industrial relations, for the Cleveland maker of business machines. "We recognized it as another opportunity to bring our employees up to date on our industrial relations programs. They keep developing through day-to-day administrative decisions and interpretations. Despite all the accepted forms of communication, it is difficult to keep everyone informed. The seminar promised to help meet this continuing need."

After the 1959 strike was settled, the company signed a comprehensive contract, the first in its history. (Before then, it had only page-long letters of agreement.) To explain it, management ran schools for foremen. The union got permission to send stewards and committeemen.

The school was part of the genesis for the union conference.

The local also modeled its seminar after regional meetings sponsored by the international.

The program planned at first was narrow in scope; then it was broadened to include company policies when the local realized it needed management's viewpoint on some subjects. The company agreed to participate if the affair was professionally handled and had experienced moderators.

"Local 1228 agreed, and the whole conference was well run," says Mr. Franz. "The venture was an unqualified success, and full credit should go to the union. The fact that the union ran and fully financed the seminar was important to its success."

"I was impressed with the enthusiasm with which the whole program was received," says Elmer B. Miller, chairman of the conference and head of Local 1228's Education Committee.

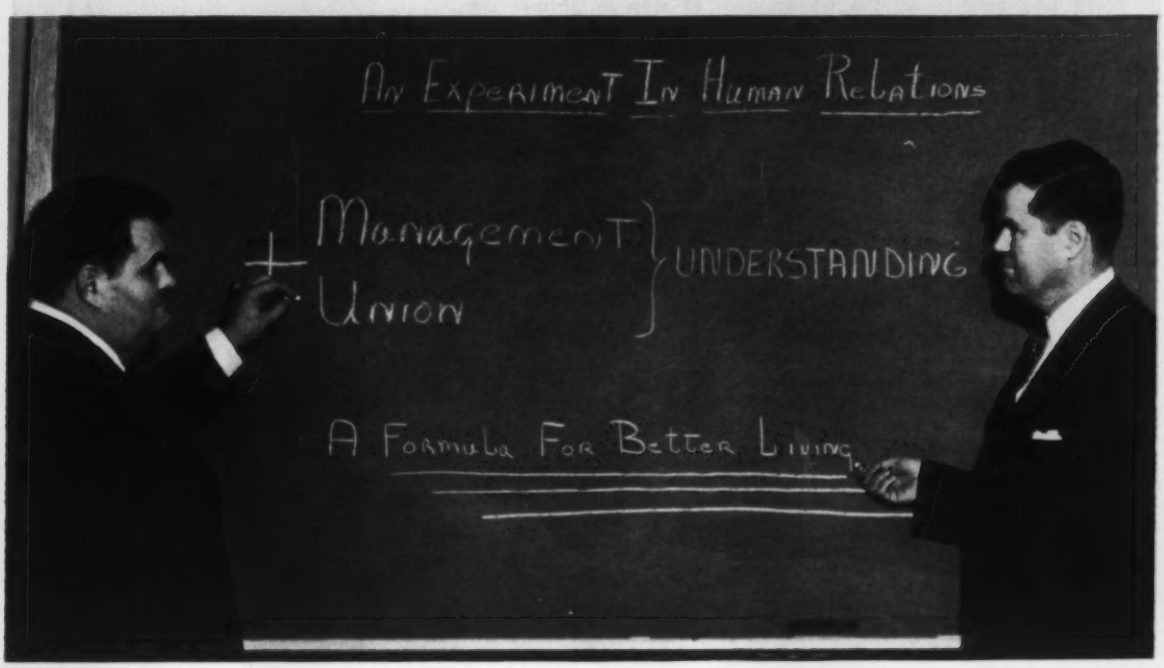
"It benefited our men," says John Rosel, local president. "They got a new slant on union problems and maybe on company headaches too."

Mr. Franz believes that, although the benefits are largely intangible, the whole concept "will have great impact in keeping our employees informed."

The employees think so too, judging from comments like this at the seminar:

". . . . It's about time we had the facts of life . . . both sides are answering the questions . . . I learned things I never knew before . . . the moderators are not taking any side . . . we should get together more often . . . we're in this thing together."

Elmer Miller, Local 1228's conference chairman (left) and Rex. T. Bragaw, assistant manager, labor relations, A-M



The Direct Approach

Lemuel R. Boulware, retired General Electric Co. vice president, believes that the best way to improve industrial relations lies in a direct appeal to workers. He and a growing number of management men say: Work with union members themselves, not with their professional leaders who are getting stale.

Mr. Boulware suggests:

1. Management, from the president on down, must set a permanent personnel policy that is enforced. Write your policy; write your job descriptions. Bargain every day, all day. A 20 per cent improvement in the average plant's productivity is possible through attention to the little things.

2. Acquire and disseminate knowledge of our economic system. Teach where jobs come from, why something for nothing is not available, what a business is, how profit is earned and not stolen, how costs are paid by consumers, how price controls will never solve inflation, and how the nonmaterial phases of our system are valuable.

3. Help all parties to come to the balanced best interest of all concerned. Don't bargain in the newspapers.

4. Be honest. Demonstrate it by deed. Show employees that you are concerned about their material and nonmaterial well-being.

5. Correct union lies. Be specific and public about it. Word of warning: You must have a deserved reputation for integrity to be effective.

6. Avoid third party intervention. Make it known that it's bad politics for the government to step in. Inform employees if the union seeks a third party's intercession.

of earnings. Because incentives vary so much from company to company, the least progress has probably been made in this category. The union strives for greater standardization; companies believe some incentives have become excessive.

6. **Economic Guides:** The objective here is to recommend appropriate guides for equitable wage and benefit settlements. Of all the things they are trying to do, this is the most theoretical. They are considering such questions as: What is productivity? How do you measure it? In a settlement, how do you take into account the legitimate interests of labor, management, stockholders, and consumers? They hope they'll narrow the area of conflict by determining the facts.

Three to five company representatives and an equal number from the union are on each subcommittee. The company men are talking for 11 firms, so they must frequently consult with the 11 company co-ordinating committee. That makes for delays.

Another problem: Many of the issues under discussion will undoubtedly become bargaining points. Both sides tend to go on guard when sensitive questions arise.

Management members feel that the talks have "contributed to better mutual understanding of views." The union says that "a few things have been accomplished."

Kaiser Steel Corp. has its own arrangements with the union in these areas. One subcommittee on grievance and arbitration procedures has been particularly active, reducing backlogs and the number of new grievances being filed. Both sides say: "Union-management relations (have improved) considerably."

The Kaiser economic committee has made some headway, but it still hasn't come up with a plan. Dr. George Taylor, chairman, says when asked about progress: "It isn't often that you ask an inventor when he is going to finish."

Bargaining's Future

We'll continue to have discord and strikes, but signs are increasing that both sides are seriously attempting to find more common ground.

In a book, *The Impact of Collective Bargaining on Management*, Harvard Professors James J. Healy, E. Robert Livernash, and the late Sumner H. Slichter interviewed officials representing 150 companies, 25 industrial associations, and 40 unions. Despite the many failures and other shortcomings of collective bargaining, the authors say:

"The . . . system must be regarded as one of the most successful economic institutions in the country. In the great majority of plants, it has produced rules and policies that are fair to both sides and that permit management to conduct operations efficiently."

PLAN FOR PROFIT GROWTH

Prepare for Profit Growth

On Dec. 18, STEEL will conclude this series with a summary of the 24 articles that have been appearing biweekly since Jan. 16, 1961. For a free copy of any or all in the program, write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

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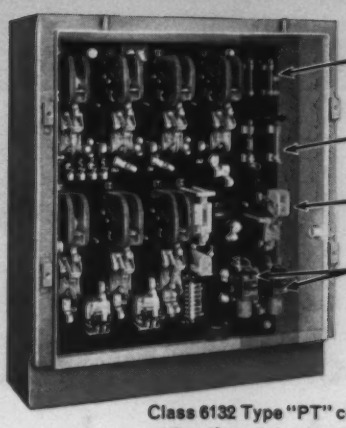

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Space Saving • compact controllers fit easily in crane cabs, on crane walkways and in congested areas for other mill applications. Front connection permits mounting against walls or girders.

Full Protection • now available with self-contained undervoltage and overload protection. Also supplied without protection for use with separate protective panel.

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Automatic Acceleration • relays adjustable from 0.2 second or more per step. Automatic acceleration reduces wear on motors and control.

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Choice of Master Switches • dynamic lowering controllers furnished with 4-point speed control. Choice of 3 or 4 point master switches on reversing plugging controllers.

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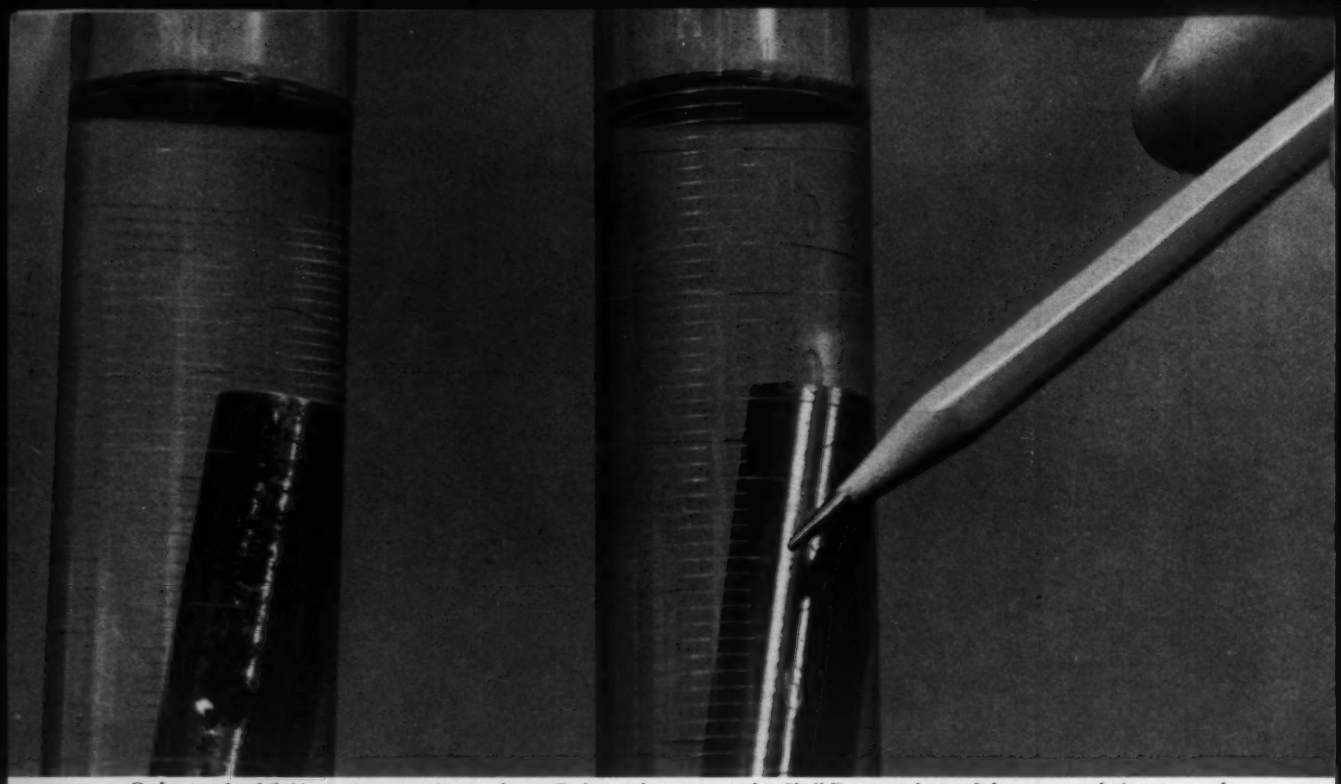

Carbon steel rod (left) rusts in water after two hours. Rod on right is immersed in Shell Dromus solution. It has not rusted after six months.

REPORT:

Shell reports on ten features of Dromus Oils that can help you reduce cutting time and costs

THE Shell family of Dromus® Oils includes both solution-type and emulsifiable cutting fluids.

Each Dromus product has its own area of application—depending on water hardness, metal characteristics and specific job requirements. However, the entire range of Dromus Oils offers these ten benefits:

1. Dromus Oils are concentrates. They are designed to be mixed with the proper quantity of water at point of use for optimum results.

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3. Dromus Oils contain an effective germicide. Result: less danger of rancidity and bacterial growth.

4. Dromus Oils do not separate. Even when mixed into emulsions containing more than 50 parts' water, Dromus Oils maintain their stability.

5. Dromus Oils prolong grinding wheel life. They prevent the wheel from "loading up" with metal from the work.

6. Dromus Oils provide effective corrosion protection for tool and workpiece. (See photograph above)

7. Dromus Oils permit greater dilution than many soluble oils.

8. Dromus Oils wash away metal chips with high efficiency. Chips then settle out of the emulsion.

9. Dromus Oils can be kept in the machine during plant shutdowns.

10. Dromus Oils are made under strict controls. Manufacture of Shell Dromus Oils is scientifically controlled.

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American:

CALENDAR YEAR SALES
(100 in. wheelbase)

1961*	120,000
1960	118,200
1959	93,700
1958	46,900

Market for cars the size of Rambler American is growing . . .

Metropolitan:

CALENDAR YEAR SALES
(85 in. wheelbase)

1961*	9,100
1960	11,700
1959	14,500
1958	12,700

Source: American Motors Corp.
*Sales for last seven weeks of year estimated by STEEL.

But Metropolitan's sales shows that cars can't be too tiny

The Case for the Smaller Compacts

EVER SINCE Detroit heard that Ford Motor Co. is tooling a car smaller than the Falcon, it has been asking: Is there a market for subcompacts? If so, how small should the cars be?

American Motors Corp.'s experience with its smaller cars furnishes a clue. The 85 in. wheelbase Metropolitan has slumped steadily in sales since domestic compacts were introduced. But the 100 in. American has continued to gain despite hot competition from larger compacts like the Falcon, Corvair, and Valiant—their wheelbases range from 106 to 109 in.

Volkswagen is another example. Although domestic compacts have squeezed out many imports, VW sales continue to climb. Latest registrations through September show this year's sales are up to 134,000 against 115,000 for 1960. VW has a 94.5 in. wheelbase. Ford's impending Cardinal reportedly is built on a 97.5 in. wheelbase.

Price is part of the picture too. VW delivers in New York for $1595. Other popular imports cost even less. Delivered prices of the Rambler American start at $1895, while the cheapest Corvairs and Falcons cost $140 more. (The prices include excise taxes.)

Ward's Automotive Reports shows that production of cars with factory prices of less than $1800 (no excise, delivery, or handling charges) rose from 1.6 per cent in 1959's model run to 3 per cent in 1960. The figure is up to 3.8 per cent (205,000 units) this year. Over half are Americans. The rest are Falcons and Larks sold mainly on fleet discounts.

• **Market Exists** — Ford analysts

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have indicated there must be at least a 250,000 unit market for the subcompacts. Some 300,000 of this year's expected 400,000 import sales will be in the subcompact price-size category. Add 100,000 Americans, and you have a 400,000 unit market for cars which have 95 to 100 in. wheelbases and list under $1800 at the factory.

• **GM Won't Compete** — Unlike Ford, GM's Chevrolet Div. has no immediate plans to enter the subcompact market. The rear engine Corvair is getting some stiff competition. In the 1961 model run, 297,000 Corvairs were built vs. 489,000 Falcons. Now the 110 in. wheelbase Chevy II appears to be competing as strongly with Corvair, Falcon, and Valiant as it is with Fairlane and the least expensive Plymouths. Many Corvair models are priced within $10 of Chevy IIs.

Venders say Corvair plans a mild facelift in 1963. Look for this car to push farther into the luxury compact field. Almost half of its 1961 model run (132,000) was equipped with bucket seats, the trademark of the fancy Monza series. Volkswagen's Karmann Ghia registrations indicate this market is still unsaturated. Its U. S. deliveries rose from 2400 to 11,000 in four years. Target for 1962: 15,000 sales.

Chevy II Goes Foreign

Production of the Chevy II in Argentina starts next spring. It will be the first GM passenger car to be built in a South American country. Two big expenditures will be made: The company will spend $21 million to expand its truck production facilities in that country and another $21 million to add capacity and provide passenger car tooling.

Called Project 280 around the GM Building, the program calls for 9000 cars in 1962. The figure will be boosted to 15,000 in 1963 and to 20,000 the following year. Initially, GM Argentina S.A. plans to make body stampings and to assemble the car in its Buenos Aires plants, but in accordance with Argentine regulations, GM will be building the six cylinder engine in that country by the end of 1963.

The move will double the size of GM's Argentine facilities. Employment will go from 900 to 3700.

New Model Notes

As 1963 tooling programs move into their final stages, suppliers and toolmakers tell STEEL that GM is retooling its "C" body for the larger Oldsmobiles, Buicks, and the Cadillac. Significance: A new styling theme may be in the works.

Corvette will get a new body and a new engine next year, say supplier sources. Fiberglas will still be used in the body.

Surprise move: The word is out that Plymouth will come up with another new body shell and new sheet metal next year. The development is unexpected because Chrysler Corp. retooled for its 1962 body. Apparently, the change is being made to give Plymouth more individuality. It now shares a body shell with Dodge, and it's difficult to tell the cars apart.

In the materials area: Diffusion coated steels are getting a long look from automakers. As far as it is known, the material is utilized in only one car in production today. (It is cast for Corvair's valve seat inserts.) Arvin Industries Inc., Columbus, Ind., has 100 mufflers on test that contain the diffusion coated steels. It's part of a cost-performance evaluation program. So far, the material appears to have durability characteristics between those of aluminized steel and MF-1 stainless. The price (around 20 to 22 cents a pound) is also a compromise. Automakers must be able to get the material in coil form before they can seriously consider it for production. At least four mills are installing such facilities.

Makers of plastics are investigating gas tanks and complete dashboards for future cars. Suppliers say that Phillips Chemical Co., Bartlesville, Okla., has blow molded 7 and 16 gallon gas tanks for outboard motors from polypropylene.

Another producer of plastics is trying to sell American Motors Corp. on the idea of molding the entire Rambler dashboard from Delrin. Shrinkage is one problem. On some early jobs, the one piece molding came up ½ in. shorter than planned.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	354,711	407,691
October	557,200	617,972
10 mo. Totals	4,283,085	5,575,048
November		597,638
December		523,422
Total		6,696,108
Week Ended	**1961**	**1960**
Oct. 28	159,136	150,019
Nov. 4	152,855	145,537
Nov. 11	152,286	138,682
Nov. 18	154,230	149,753
Nov. 25	124,678†	111,091
Dec. 2	155,000*	135,348

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Firms Hold Wage Line

Detroit Tooling Association (DTA) shops have won a below pattern settlement from the UAW. Wages are frozen for three years at the current average of $3.67 an hour. The pact cuts the wage differential between captive and independent shops from 25 to 15 cents or less. Full company paid medical insurance, costing an extra 7 cents an hour, has been delayed until next fall. Pension benefits per worker have been boosted from $2.40 to $2.80 a month. In the third year of the contract, tool shop owners will start contributing 6 cents per worker per hour into a supplemental unemployment benefits pool which will serve all of the DTA member shops.

Blaine Marrin and Robert Mills, presidents of the two locals serving DTA workers, agree that the industry has lost much tool and die work from the auto industry. The move to greater interchangeability of parts, the shutdown of many Detroit area auto plants, and the growth of captive operations are largely responsible. The association has only 57 member shops. At one time, it had 86. Employment has dropped from 12,000 to 8000. Only 6000 are working now.

Now **you can get USS "T-1" Steel from Steel Service Centers coast to coast**

Processing plant of Oriole mine. USS "T-1" Steel pays dividends in longer chute life, under the grinding action of coal and rock.

Chutes of USS "T-1" Steel outlast others 3 to 1

Coal and rock scraping across a piece of metal are highly abrasive. At the Bell and Zoller Coal Company's Oriole Mine near Madisonville, Kentucky, gravity chutes lasted about three months.

Oriole switched to USS "T-1" Steel furnished heat treated to a minimum hardness of 321 Brinell. In this harder condition "T-1" Steel offers maximum resistance to impact abrasion, yet retains toughness and weldability. These new chutes lasted nine months to a year. The extra cost of "T-1" Steel was wiped out almost immediately by the sizeable saving in the costs of material and fabrication, and by the extended life of the new chutes.

Now, USS "T-1" Constructional Alloy Steel, at 321 minimum Brinell, is used for all sluice and refuse chutes in the Oriole processing plant. More than 3,400 tons of coal and rock go banging and clanging down the chutes daily. Despite impact, abrasion and corrosion, the ⅜-inch-thick plates of "T-1" Steel stay smooth and clean. Coal doesn't clog the chutes.

Other uses where "T-1" Steel saves money. Shovel buckets can be built larger and lighter to scoop more load; truck bottom plates take more battering when made of "T-1" Steel and last longer. Continuous miner front ends, conveyors, vibrator frames—all take punishment better and reduce maintenance costs when made of USS "T-1" Constructional Alloy Steel.

USS "T-1" Steel and the new lower priced "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributor of USS "T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks.

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USS United States Steel

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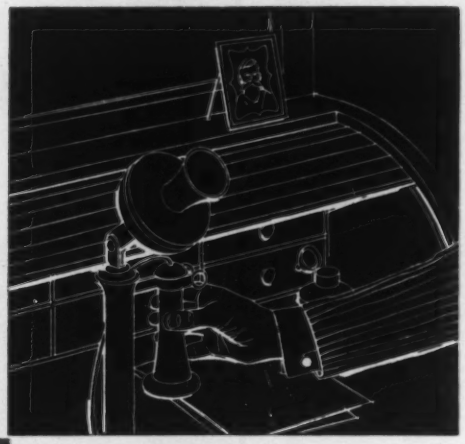
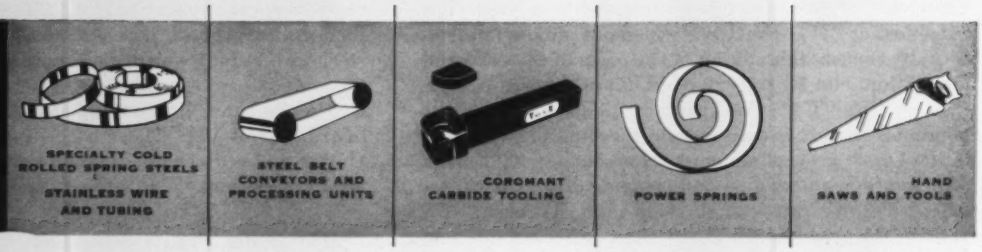


In over 40 years of tough competition, SANDVIK quality has earned, held and expanded SANDVIK'S place in American industry.

To keep old customers and to make new ones over the years, Sandvik *had to deliver superior performance, consistently*. Nothing else explains Sandvik's growth.

5 SANDVIK QUALITY PRODUCT LINES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Confidence in Upturn Gets Stronger

BUSINESS SENTIMENT has at least one thing in common with business statistics: They both tend to lag actuality by a month or more. So we note a great deal more optimism now than we did four to six weeks ago—although conditions then were definitely improving.

It follows that by the end of the year optimism should be even greater than it is now because early signposts indicate the November data will be better than those for October, and the trend is not expected to level off in December.

• **Biggest Boon**—Right now the most important signpost is in the consumer segment of the economy. Department store sales, auto sales, and many other types of retail trade are at the best levels in many months. Department store sales (see Barometers of Business) are farther ahead of the year-ago periods than at any previous time this year (and only partly because of the decline in late 1960). No doubt some of the gain is a reflection of early Christmas shopping.

Secretary of Commerce Hodges said last week that he expects December retail sales to be 4 or 5 per cent over the year-ago total. That would amount to $18.8 billion seasonally adjusted, or only a shade under the all-time high of $18.9 billion in April, 1960.

• **No Letup in Autos**—Leading the sales parade is the auto industry. It is beginning to look like the record set in October was merely a prelude. Sales in the first ten days of November set a new peak for the period. And they climbed another notch to establish a new mark for the second ten day period. In the first 20 days, sales ran 10.3 per cent ahead of the year-ago pace, when the month ended in a tie with the all-time best November (1955).

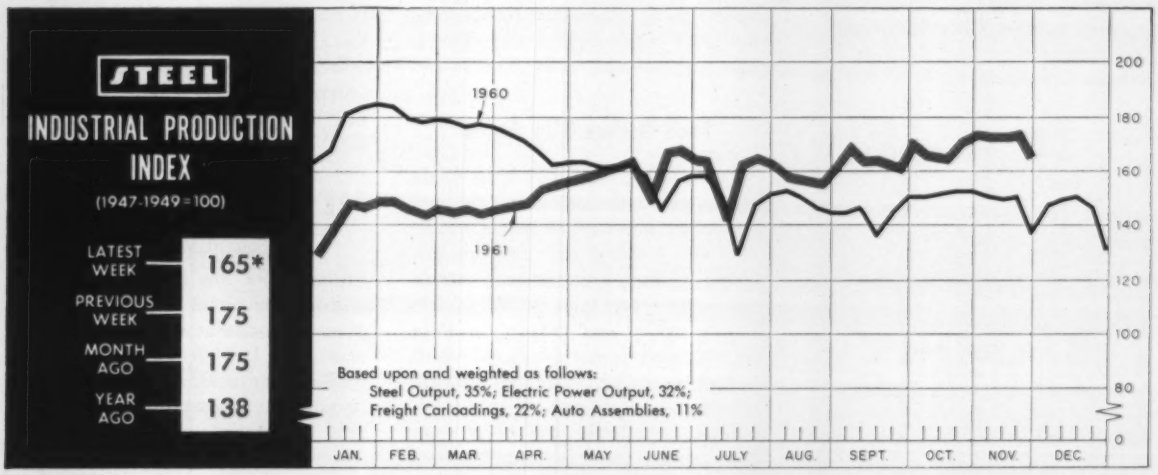
• **Big Reason**—It takes a combination of many factors to result in such dramatic improvement, but the basic fact is that there is more money to be spent now than ever before. Personal income took a jump ($4 billion) in October to a seasonally adjusted annual rate of $425 billion, an all-time high. Weekly earnings of factory workers climbed to a new peak of $94.71, or $2.21 better than in September. Raymond E. Danto Associates, Detroit, claims that with income at that level, with consumer savings at an all-time high, and with the stability in short term debt that has existed over the last nine months, consumers are in a financial position to support 7 million car sales a year. They could expand purchases of durable goods as a whole by 10 per cent—if they choose to do so.

Dun & Bradstreet Inc.'s weekly report on consumer buying indicates that they are currently making that choice. Retail purchases are surging all over the country—with such items as TV sets, stereo equipment, electric housewares, and lamps getting their share.

"Of all the areas that are important to the economy," says John W. Harriman, economist for Tri-Continental Corp., a closed-end investment company in New York, "consumer expenditures occupy the most strategic position. Given a reasonable increase in these expenditures, particularly those for automobiles, forces should be set in motion that will propel the economy upwards at least through 1962."

Appliance Sales Pace Quickens

The appliance industry is in the vanguard of this upturn in con-



*Week ended Nov. 25.

COSTS UP?

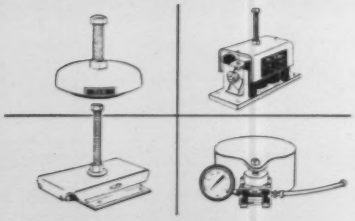
MACHINES TIED DOWN?

Plant moves, rearranging layouts, new machine installations all cost money — and the cost *is* excessive if you make a practice of lagging your production equipment to the floor.

Wouldn't it save money in your operation if you could forget about spotting, drilling, shimming, lagging and all the other costly necessities that go with tying down machinery? By using BARRYMOUNTS® you eliminate those expenses *and* repeat your savings whenever you relocate a machine.

Barry offers *three* different resilient elements: neoprene, helical springs or air to solve your individual requirements. These quality-engineered Machinery Mounts not only provide the ultimate in layout flexibility — they pay big dividends too — isolating shock and vibration, improving precision, reducing machine and building maintenance. Even operator efficiency goes up as noise levels come down.

If you want to add cost-saving efficiency to your operation — look into a BARRYMOUNT® program. Write for Bulletin 60-04C, "Practical Considerations When Installing Machinery."



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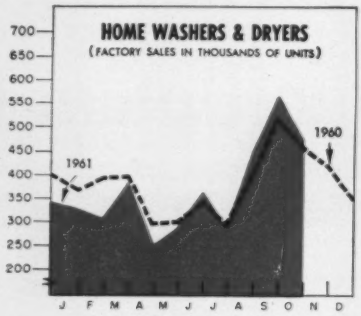
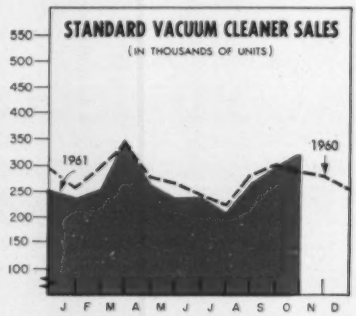
THE BUSINESS TREND





	Washers		Dryers	
	1961	1960	1961	1960
Jan.	228,919	254,565	103,158	111,603
Feb.	227,562	283,640	81,310	108,367
Mar.	305,590	305,635	82,093	90,205
Apr.	209,695	235,828	46,042	53,213
May	247,904	243,943	42,672	53,700
June	304,295	276,955	60,705	64,950
July	228,422	217,655	64,923	72,580
Aug.	332,562	296,499	122,346	105,119
Sept.	401,862	352,711	162,857	165,508
Oct.	321,870	305,808	152,983	151,921
Nov.	.....	275,300	.....	142,000
Dec.	.....	223,500	.....	119,200
Totals	....	3,272,039	.....	1,238,366

American Home Laundry Mfrs. Assn.

Charts copyright, 1961, STEEL.

	1961	1960	1959
Jan.	242,515	258,330	242,516
Feb.	257,930	294,483	271,396
Mar.	349,972	339,918	346,557
Apr.	265,032	278,391	317,402
May	240,866	265,556	257,345
June	242,001	245,790	275,974
July	213,932	223,008	221,232
Aug.	270,100	280,575	268,165
Sept.	302,229	301,935	305,096
Oct.	327,608	290,059	330,899
Nov.	.....	280,550	290,130
Dec.	.....	254,631	293,818
Totals ...	.....	3,313,226	3,420,830

Vacuum Cleaners Mfrs. Assn.

sumer purchasing. As seen by the tables and graphs above, manufacturers have been ahead of the year-ago pace (on a month by month basis) for some time and are closing the gap on a cumulative basis. Total factory sales of home laundry appliances were only 2 per cent behind the 1960 total after ten months. Output of vacuum cleaners lagged by only 2.4 per cent.

Among the electric appliances, ranges, water heaters, dishwashers, and food waste disposers pushed ahead of the cumulative year-ago figures in September. Most of the others are in a position to overtake the 1960 totals before the year is out.

Tool Orders Slip Again

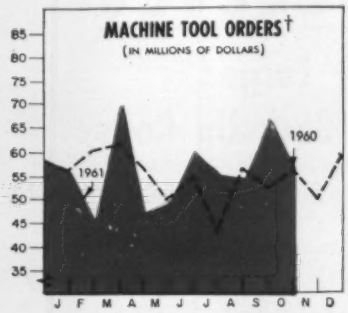
In a pattern that has been fairly well established during the postwar recoveries, the capital goods industries are trailing the general economic pickup. Individual industries have made false starts, as seen by the tables and graphs on Page 67, but there is not much on which to base a strong, sustained upward movement at present.

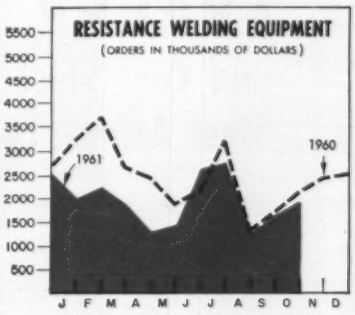
There no doubt has been some improvement in the machine tool industry this year, but the year as a whole still will be only mediocre by comparison with the early 1950s. After reaching the second best level of the year in September, new orders declined in October—as they have following each of the previous peaks in the first and second quarters.

In each of the first three quarters, the peak came on the last month of the period, which is probably only a coincidence. It may be further noted that in each of the preceding three years, the best month of the last quarter (and one of the better months of the year) was December. If the pattern holds, November totals will be at about the October level, followed by another peak this month, pushing new orders for the year (for both cutting and forming types) over the $700 million mark.

P&E Spending Upturn in Doubt

The Federal Reserve Bank of Philadelphia has come up with its annual survey of capital spending plans by manufacturers in the Delaware and Lehigh Valleys, and the outlook for 1962 is anything but reassuring. Expenditures for plant and equipment next year will fall 14 per cent below those for this year, the survey reveals, which casts





	New Orders (000 omitted) 1961	1960	Shipments (000 omitted) 1961	1960
Jan.	$56,100	$56,450	$45,500	$46,400
Feb.	46,400	60,600	45,650	51,950
Mar.	70,050	61,950	54,850	64,500
Apr.	47,650	51,850	53,700	55,100
May	49,600	49,950	57,900	56,350
June	60,500	55,100	64,200	63,100
July	55,650	42,950	49,750	51,300
Aug.	54,900	56,850	47,000	47,900
Sept.	66,600	52,300	51,900	53,950
Oct.	56,950*	56,200	56,850*	51,350
Nov.	.....	49,950	.....	48,550
Dec.	.....	59,000	.....	61,350
Totals	.....	$653,150	.....	$651,800

†Cutting and forming. *Preliminary.
National Machine Tool Builders' Assn.

	Net Orders 1961	1960	Shipments 1961	1960
Jan.	2,013	3,258	1,731	1,582
Feb.	2,236	3,732	1,916	2,563
Mar.	1,871	2,653	2,739	3,011
Apr.	1,322	2,446	2,613	2,943
May	1,464	1,871	2,318	2,310
June	2,670	2,205	2,734	3,267
July	2,744	3,244	2,787	2,221
Aug.	1,308	1,330	1,753	2,528
Sept.	1,632	1,689	1,331	2,559
Oct.	1,912	2,145	1,841	2,328
Nov.	....	2,457	....	1,927
Dec.	....	2,525	....	1,974
Totals	....	28,933	....	29,218

Resistance Welder Manufacturers' Assn.

grave doubt on the strength of the recovery.

"It is tempting to say that history will repeat itself, that plant and equipment spending will recover in the spring . . . It is quite possible that continued softness in retail sales (which seems to have dissipated) coupled with uncertainty concerning the international situation, could cause manufacturers to hold back new spending on equipment for a while longer," the bank reported.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,040[1]	2,032	1,393
Electric Power Distributed (million kw-hr)	15,000[1]	15,678	13,884
Bituminous Coal Output (1000 tons)	8,870[1]	8,625	8,257
Crude Oil Production (daily avg—1000 bbl)	7,200[1]	7,206	6,992
Construction Volume (*ENR*—millions)	$304.8	$533.7	$613.4
Auto, Truck Output—U. S., Canada (*Ward's*)	155,849[1]	189,423	136,299
TRADE			
Freight Carloadings (1000 cars)	520[1]	591	471
Intercity Truck Tonnage (changes from year ago)	+9.5%	+13.6%	−2.2%
Business Failures (Dun & Bradstreet)	308	336	329
Currency in Circulation (millions)[2]	$33,351	$33,223	$32,532
Dept. Store Sales (changes from year ago)[2]	+6%	+4%	−7%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$31,702	$29,141	$29,510
Federal Gross Debt (billions)	$296.8	$295.9	$290.1
Bond Volume, NYSE (millions)	$28.4	$34.4	$21.5
Stocks Sales, NYSE (thousands of shares)	17,596	21,900	12,710
Loans & Investments (billions, adjusted)[3]	$118.2	$116.9	$107.3
U. S. Govt. Obligations Held (billions)[3]	$34.2	$33.8	$29.1
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	223.0	223.5	222.0
All Commodities[6]	118.9	118.9	119.6
Commodities Other than Farm & Foods[6]	127.5	127.6	127.8

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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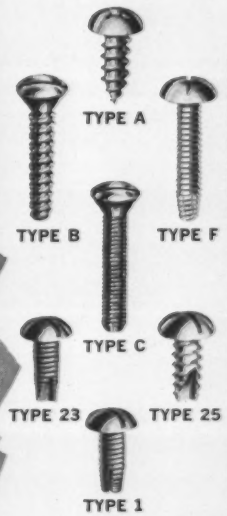

All types are uniform in size, heat treated to highest torque limits. They feature sharp, well-formed, full-bodied threads and deep, clean slots.

Sizes from #2 to ⅜". Finishes: nickel, cadmium, zinc, brass, bronze, chrome, Parkerizing, Iridite, blued.

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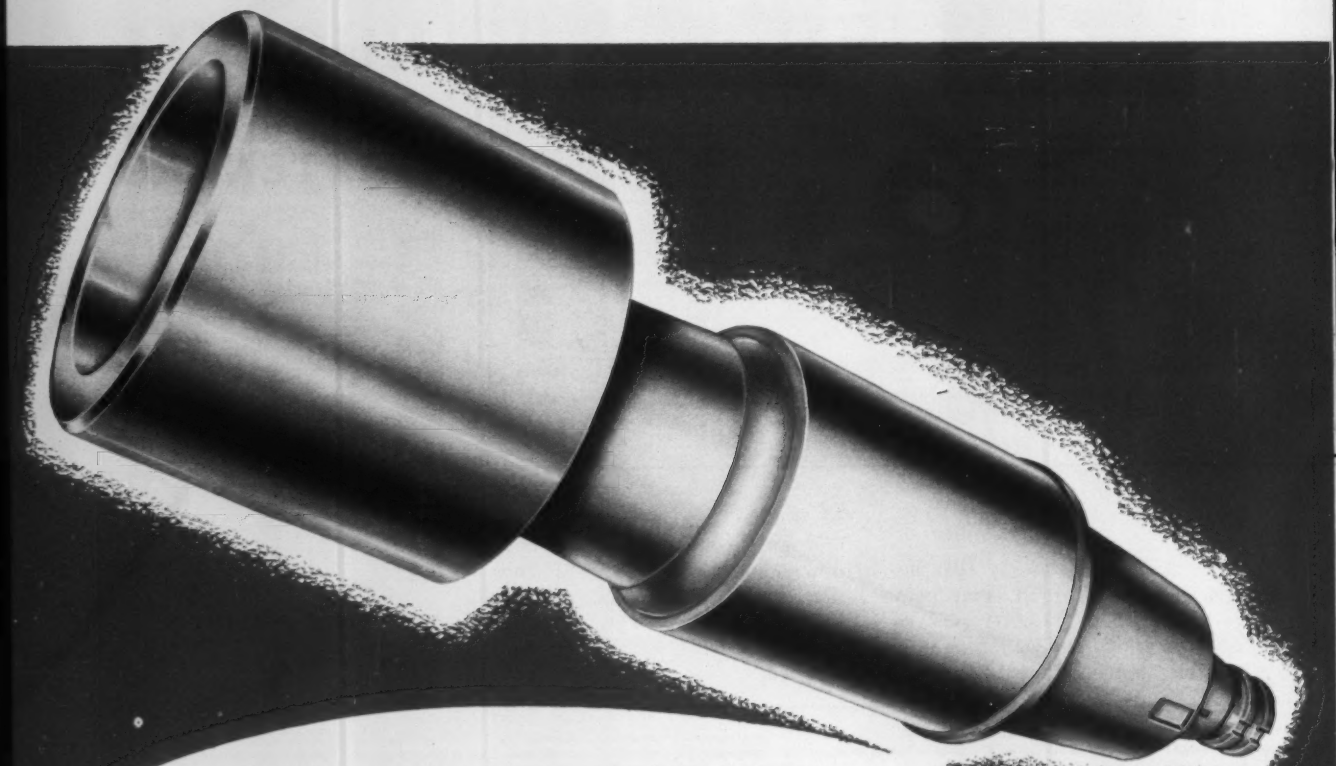

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Operations Now Include:

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If you're looking for a complete back-up roll service that'll meet your most exacting specifications, contact your nearest Ohio roll sales engineer.

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LIMA, OHIO

OHIO IRON and STEEL ROLLS

Carbon Steel Rolls	Flintuff Rolls	Denso Iron Rolls
Ohioloy Rolls	Double-Pour Rolls	Nickel Grain Rolls
Ohioloy "K" Rolls	Chilled Iron Rolls	Special Iron Rolls
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OR-46

JAMES W. SCHUETZ
Aetna-Standard post

FRED R. BROWN
Spang & Co. p. a.

QUENTON M. BLOOM
new div. post at Selas

STANLEY A. BRANDENBURG
joins Cone Automatic

James W. Schuetz was made chief engineer, tube mill and cold draw equipment, **Aetna-Standard Div.**, Blaw-Knox Co., Pittsburgh. He succeeds the late **Gus Mandry. Robert J. Rau** was made assistant chief engineer design-tube mill equipment; **Paul L. Beacom** assistant chief engineer design-cold draw equipment.

Alaric R. Bailey was elected president of **Crescent Tool Co.**, Jamestown, N. Y., and vice president of the parent company, Crescent Niagara Corp., Buffalo.

S. A. Crabtree succeeds **Norman W. Foy**, retired, as vice president-sales at **Republic Steel Corp.**, Cleveland. Mr. Crabtree was general manager of sales.

Fred A. Simmons was made sales manager, **Nylok Corp.**, Paramus, N. J. He was aircraft products sales manager for Camcar Screw & Mfg. Div., Textron Inc.

Fred R. Brown was appointed purchasing agent of **Spang & Co.**, Butler, Pa., and its affiliates, Ferroslag Process Corp. and Butler Refractories. He was with the Purchasing Dept. of Pittsburgh-Des Moines Steel Co.

Quenton M. Bloom was made manager of the newly formed Steel Mill Furnace Div. at **Selas Corp. of America**, Dresher, Pa. He rejoins Selas after a period at Weirton Steel Co.

Herman Kockritz was made vice president, Benematic Div., **Benerson Corp.**, Evansville, Ind. He directs sales and marketing.

Dr. Harry K. Waldes was elected chairman of **Waldes Kohinoor Inc.**, Long Island City, N. Y. He continues as executive vice president. **George Waldes** was elected president. He was vice president-sales and production. They succeed the late **Sigmund Waldes**, chairman and president.

Stanley A. Brandenburg was made domestic sales manager, **Cone Automatic Machine Co. Inc.**, Windsor, Vt. He was president of Brandenburg Machinery Co., Dayton, Ohio, where he also acted as a consultant in machine tool design.

J. L. Champion was named director of purchasing of **Clinton Engines Corp.** His office is at the Maquoketa, Iowa, plant. He was formerly at the Clinton, Mich., plant.

James D. Stephens was made manager of the new Nuclear & Special Products Dept. of **Babcock & Wilcox Co.'s** Boiler Div., Barberton, Ohio.

Leonard White was made purchasing agent, **Edgcomb Steel of New England Inc.**, Nashua, N. H.

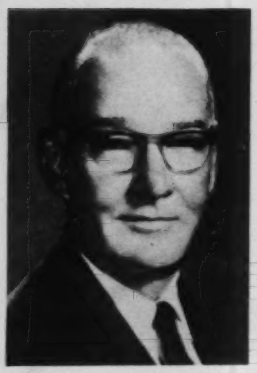
Sydney Minault, manager of manufacturing, **Dunn Engineering Corp.**, Cambridge, Mass., was promoted to vice president-manufacturing. He joined Dunn earlier this year. Previously, he was director

FRED A. SIMMONS
Nylok sales manager

S. A. CRABTREE
Republic Steel sales v. p.

GEORGE WALDES
Waldes Kohinoor president

SYDNEY MINAULT
Dunn Eng. v. p.



HERMAN P. RASSBACH
Union Carbide Metals post

HANS HOGEMAN
American Bosch eng. mgr.

WILLIAM W. WRIGHT
Beckman Instruments exec.

KARL E. PEGLOW
Clearing Div. v. p.

of manufacturing, Nortronics Div., Northrop Corp.

Herman P. Rassbach fills the new post of general manager-sales development and metallurgical service for **Union Carbide Metals Co.**, New York, division of Union Carbide Corp. He was Cleveland manager-metallurgical service.

Hans Hogeman was made manager of engineering for **American Bosch Div.**, Springfield, Mass., American Bosch Arma Corp. He was assistant manager of engineering in charge of fuel injection products.

John C. Ahearn was made product manager of carbon steel for **Edgcomb Steel of New England Inc.**, Nashua, N. H.

Russell W. Kenyon was made vice president-sales, **Kerns United Corp.**, Calumet City, Ill. He succeeds **Bruce W. Glenn**, recently named president of Kerns Lubricants Ltd., newly formed Canadian company in Toronto, Ont.

William W. Wright, financial vice president, **Beckman Instruments Inc.**, Fullerton, Calif., was named executive vice president-administration. **Robert M. Ward**, former manager of the Beckman Berkeley Div., was named a vice president with responsibility for planning and supervision of the corporate operating staff. **Robert Erickson**, executive vice president since 1958, continues as chief operations officer, responsible for Beckman's eight operating divisions, and adds supervision of foreign operations headquartered in Geneva, Switzerland.

Hugh F. Gillespie was made chief industrial engineer by **Taylor Fibre Co.**, Norristown, Pa. He is in charge of manufacturing methods and standards at the Betzwood, Pa., plant.

Fred Hennig Jr., Chicago district sales manager, **Kennametal Inc.**, was appointed field sales manager, a new post. He assumes new duties Jan. 1 at headquarters in Latrobe, Pa.

Karl E. Peglow was named vice president - manufacturing, **Clearing Div.**, Chicago, U. S. Industries Inc. He was director of manufacturing.

H. M. Harper Co., Morton Grove, Ill., named **John A. Stevenson** assistant general sales manager in charge of Metals Div. sales; **John I. Mengel** assistant general sales manager, Fastener Div. sales.

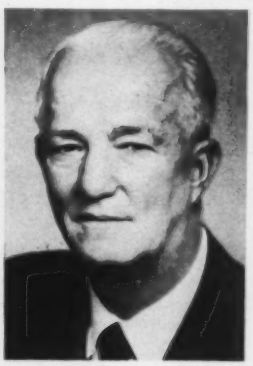
Paul W. Leake was appointed president, **Shinn Engineering Inc.**, Santa Ana, Calif., subsidiary of Shinn Industries Inc. **John Meisenbach** succeeds Mr. Leake as vice president.

A. R. Rios was made vice president of **Airco Co. International**, New York, division of Air Reduction Co. Inc. He is responsible for marketing operations.

Charles E. St. Thomas was named a senior vice president of **Engelhard Industries Inc.**, Newark, N. J., effective Jan. 1. He is now president of St. Thomas Associates, management consultants.

RUSSELL W. KENYON
Kerns United v. p.

FRED HENNIG JR.
Kennametal field sales



A. R. RIOS
Airco Internat. v. p.

CHARLES E. ST. THOMAS
joins Engelhard Industries

Edwin W. Fish was named building products manager of **Kaiser Aluminum & Chemical Corp.**, Oakland, Calif. He was manager of the Market Development Dept.

Earl M. Underhill was made manager of engineering with **Crucible Steel Co. of America's** Magnet Div., Harrison, N. J. He was chief magnet engineer at the plant.

John J. Lohrman was elected vice president - administration, **Russell, Burdsall & Ward Bolt & Nut Co.**, Port Chester, N. Y. He was assistant to the president.

William B. Kempton was made director of sales, **Keystone-Seneca Wire Cloth Co.**, Fostoria, Ohio. He was sales manager, Eastern Div.

Arthur Heine was made manager of mechanical manufacturing at **Anocut Engineering Co.**, Chicago.

James H. Taylor was made general manager of **Emhart Mfg. Co.'s** Portland, Conn., Div. He joined Emhart in July as manager-products and market planning.

Walter Batz was promoted to senior research engineer for **Jones & Laughlin Steel Corp.**, Pittsburgh.

Arthur X. Schmaltz was elected treasurer of **Brooks & Perkins Inc.**, Detroit, to succeed the late **L. A. Curnoe.** He continues as assistant secretary.

William G. Royce was appointed director of engineering at **Cimron Corp.**, San Diego, Calif. He was with Kin Tel Div., Cohu Electronics Inc.

George Bullen was made general manager, Special Products Div., Waverly, N. Y., **Twin Coach Co.**

Elsby B. Goffinet was made Detroit regional manager, **Eutectic Welding Alloys Corp.**

James C. McGill was made assistant to the general manager, Bearing Div., **McGill Mfg. Co. Inc.**, Valparaiso, Ind. He was assistant general manager, Electrical Div.

John A. Saunders, vice president-sales, was named president and chief executive officer of **General Fireproofing Co.**, Youngstown. He succeeds **A. J. Ball,** resigned. **Lawrence W. Miller** was named vice president-sales.

EDWIN W. FISH
Kaiser Aluminum post

EARL M. UNDERHILL
Crucible-Magnet eng. mgr.

JOHN J. LOHRMAN
RB&W administration v. p.

WILLIAM B. KEMPTON
Keystone-Seneca sales dir.

WILLIAM R. BAYER
Apex Smelting president

LOUIS E. EBERTS
heads Cincinnati-Nederland

William R. Bayer was elected president, **Apex Smelting Co.**, Chicago, to succeed **Louis Lippa**, retired. Mr. Bayer continues as treasurer.

Louis Zinader was made assistant Eastern regional vice president, **Luria Bros. & Co. Inc.** He assists **William J. Luria**, Eastern regional vice president. Mr. Zinader was New York district manager, a post he retains.

Heino Ekker joined **KuBar Inc.**, Cambridge, Mass., as manager of quality control. He was with the research laboratory of Miniature Precision Bearings Co.

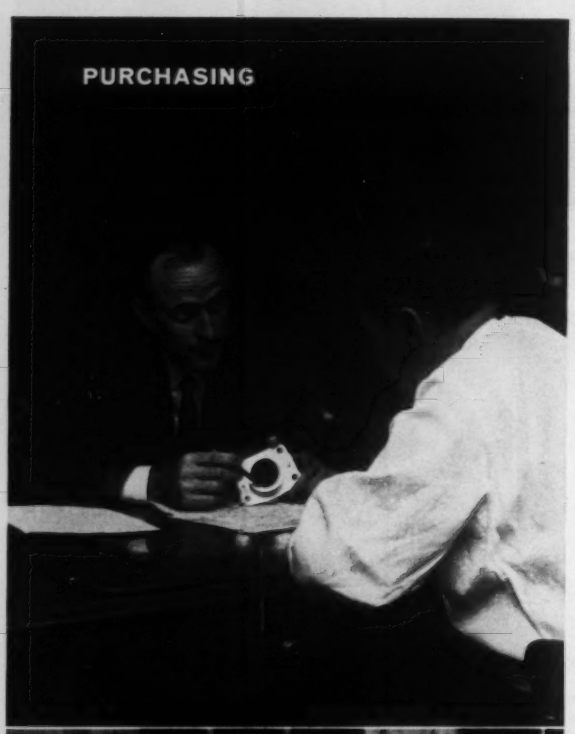
John B. Lawson was made director-administrative and manufacturing staff at **Ford Motor Co.'s** Aeronutronic Div., Newport Beach, Calif. He was general manufacturing manager of Ford's Transmission & Chassis Div., Livonia, Mich., and is replaced by **Walter Johnson**, former manager of the Canton, Ohio, forge plant.

Louis E. Eberts, assistant export manager, **Cincinnati Milling Machine Co.**, and vice president, Cincinnati Milling & Grinding Machines Inc., was named president-director of Cincinnati-Nederland N. V., subsidiary in Holland. **John H. Elfring** was made its operations manager, responsible for manufacturing and production. **Ross T. Clendening,** formerly managing director of Cincinnati-Nederland, was made assistant managing director of Weatherley-Cincinnati Ltd., England.

Dr. Lynn J. Brady joined **Automation Industries Inc.** to head its Electro-Ceramics Div. in Boulder, Colo.

Glenn V. Prible was made chief engineer, **Rust Furnace Co.**, Pittsburgh. He succeeds **H. Hayward Dineen,** now vice president and general manager. **Frank A. Alexander Jr.** was named assistant general manager, a new post. **Francis H. Bricmont** was made assistant chief engineer.

your HYATT *sales*

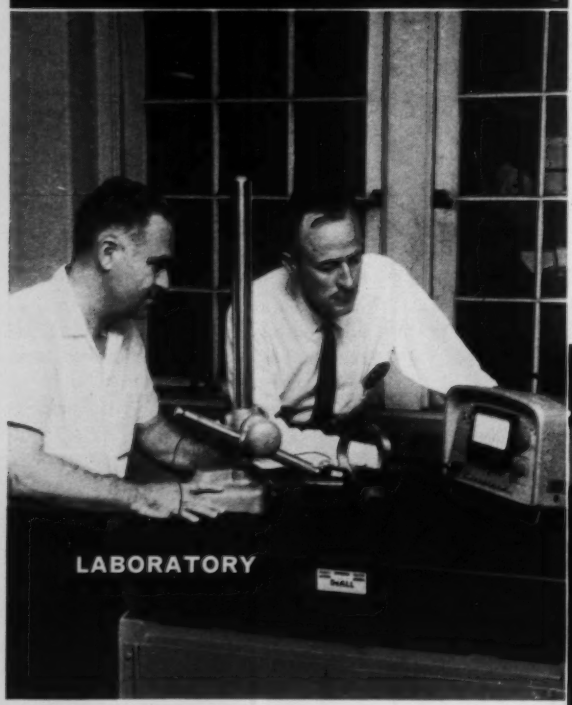


HE WORKS EFFECTIVELY TO HELP REDUCE YOUR COSTS!

No one knows more about cylindrical bearings than your Hyatt Sales Engineer! What's more, he's well versed in value analysis and can frequently produce dramatic cost reductions and important product improvement ideas. P.A.'s like his thoroughness . . . his sincere interest in making the best recommendation.

HE WORKS FROM EXPERIENCE IN PROBLEMS LIKE YOURS!

The experience and knowledge of this trained bearing specialist regularly help save vital man-hours and dollars for his customers. His painstaking study prior to every bearing recommendation has gained him an excellent reputation for efficient, dependable design suggestions.



HE WORKS TO MEET RIGID QUALITY STANDARDS!

Frequently your Hyatt Sales Engineer will spend mutually rewarding hours studying customer products or prototypes in action. This helps assure the success of critical applications and often results in valuable suggestions for product improvement, cost reductions and ideas for future product development. At left, Hyatt Sales Engineer awaits surface finish test results on race pathway of farm tractor differential bearing.

HE WORKS TO MEET YOUR TIGHTEST SCHEDULES!

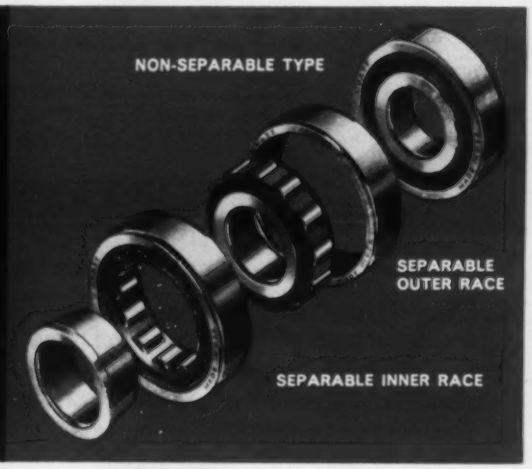
When delivery is a critical factor in your production schedule, sales department estimates or customer promises, you can rely on the *Working Partner* interest of your Hyatt Sales Engineer. Checking on your order from production line to shipping room, he works efficiently to make sure you've made a profitable purchase!

engineer is a working partner!

HE WORKS WITH OUR TOP ENGINEERING PEOPLE!

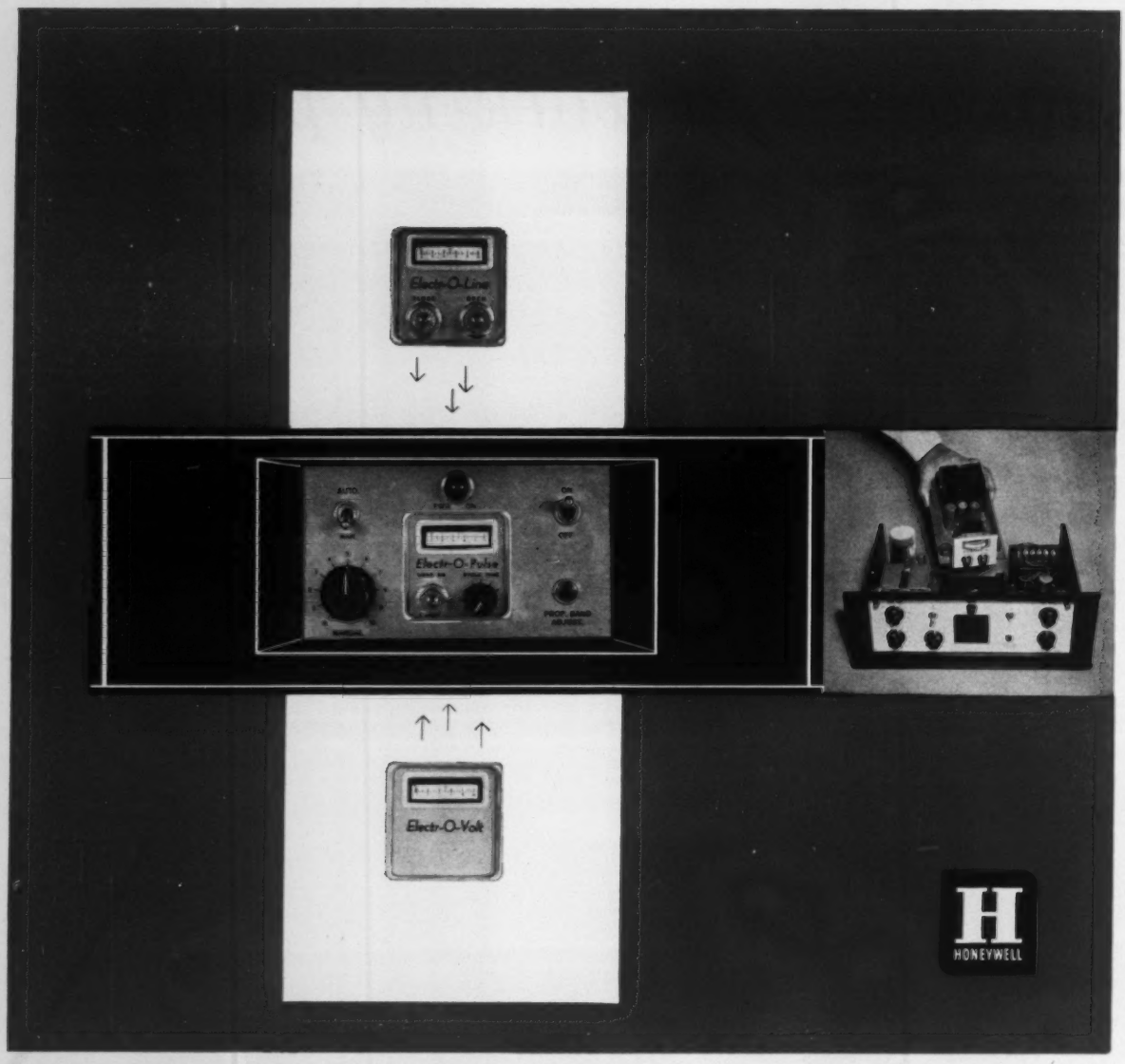
When you specify Hyatt bearings for your job, you get that *something extra* in engineering. The nation's finest bearing application engineers are assigned to your problem! What's more, you get the complete range of General Motors' vast research and engineering facilities. Above, your Hyatt Sales Engineer confers with metallurgist and thrust load experts before making final recommendation.

HE WORKS WITH THE MOST COMPLETE LINE IN THE INDUSTRY! Hyatt's new catalog (No. 162) places at your fingertips the most complete cylindrical bearing line in the industry...broad flexibility in handling all your anti-friction bearing requirements! Contact your nearest Hyatt Sales Engineer for your copy today.



HYATT *HY-ROLL BEARINGS*
FOR MODERN INDUSTRY

HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION, HARRISON, N. J.



Three ways to get peak performance from your furnaces!

1. Electr-O-Line Control Unit for position-proportioning control with reset and rate action.
2. Electr-O-Pulse Control Unit for time proportioning control with reset and rate action.
3. Electr-O-Volt Control Unit for current-proportioning control with reset and rate action.

These new Honeywell three-mode control units can actually improve the performance of your furnaces by providing the exact temperature that's needed. They include features that cannot be matched: Smooth three-mode control with extra-wide band adjustments. You can adjust the proportional band up to 500%; reset action from 0 to 100 repeats per minute; and rate time from 0 to 10 minutes. "Auto-man" switching is bumpless.

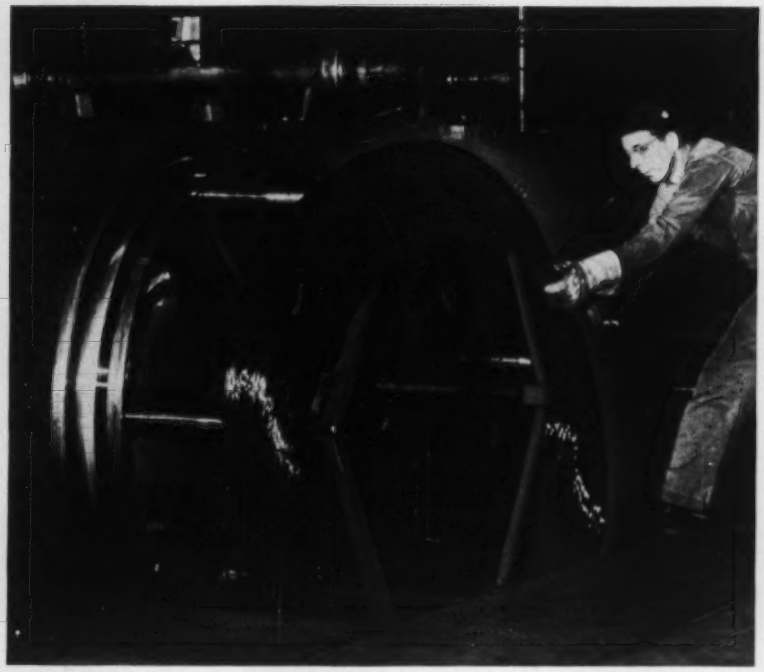
Modular construction with interchangeable control output sections. Modular plug-in construction is used throughout. Amplifier and power supply sections are the same for all three units.

For more complete details on these and other types of furnace controls, contact your nearby Honeywell field engineer. Minneapolis-Honeywell, Wayne and Windrim Aves., Phila. 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ont.

Honeywell

H First in Control SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



Wire is taken off takeup block of unit on which . . .

CF&I Produces Oil Tempered Wire

COLORADO Fuel & Iron Corp., Denver, has installed a new unit for producing oil tempered spring wire at its San Francisco plant. It can oil temper a range of sizes that normally requires the construction of two or more separate units. The installation represents a significant advance metallurgically, the company says.

The unit adds production flexibility by providing controlled variations in atmosphere composition, furnace temperature, and pull-through speed.

• **Procedure**—Coils of high carbon steel wire are placed on 12, free spinning, payoff reels, then drawn through the atmosphere controlled furnace, where the wire is heated and coated with a controllable iron oxide.

From the furnace, the wire passes through an oil quench for hardening. Next, it enters a lead drawing furnace (where the desired ductility is developed), passes through a water cooler, then runs over sheaves in an oil bath—the wire gets a light oiling before it is coiled on the takeup block.

The 300 to 600 lb finished bundles are coiled on 72 in. maximum to 16 in. minimum blocks, depending upon the wire diameter.

• **Main Feature**—A radiant tube, atmosphere controlled furnace is the key to the operation. The nitrogen-oxygen ratio in the atmosphere (which determines the amount of iron oxide coating the wire receives) can be varied. Furnace temperature (which determines product hardness) is precisely controlled to compensate for wire sizes (5/8 to 0.041 in.). The speed of the wire through the various processes can also be varied.

The variable nitrogen atmosphere is said to eliminate the need for additional units for hardening smaller sizes.

Equipment Firm Formed

Air Products & Chemicals Inc., Allentown, Pa., formed a new division, KGM Equipment Co., for the engineering, manufacturing, and marketing of welding and cutting equipment and supplies. Paul A. Eveson is president and general manager of the division. It will take over and consolidate the operations of K-G Equipment Co., subsidiary of Air Products, and Alexander Milburn Co., subsidiary of Southern Oxygen Co.

Los Angeles Firm Expands

Assembly Engineers Inc. is expanding manufacturing facilities by acquiring space more than 2½ times larger than its present plant. When relocation is complete, the company's new address will be 3650 Holdrege Ave., Los Angeles 16, Calif. The company makes precision devices for the aerospace field.

Enters Manganese Field

American Potash & Chemical Corp., Los Angeles, will enter the manganese metal field early next year with completion of electrolytic facilities at its Aberdeen, Miss., plant. Initial annual capacity: 10 million lb. Production emphasis will be on manganese in five grades: As-plated, low hydrogen, dehydrogenated, nitrided, and welding grade powder. Key posts for the new operation are held by W. P. Huhn Jr., manager of metallurgical sevices, and Robert McC. Maxwell, manager of manganese metal sales.

Buys Auto Mirror Line

Standard-Thomson Corp., Waltham, Mass., acquired the automotive mirror business of Supersite Corp., Derby, Conn. Standard-Thomson makes temperature control components for the automotive, aircraft, home appliance, and defense industries.

Auckland Gets Rolling Mill

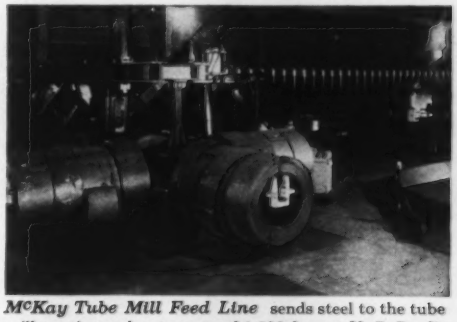
Operations have been started at an aluminum rolling mill in Wiri, a suburb of Auckland, New Zealand. The mill is a branch of Alcan Industries Ltd. of England and represents an investment of $5 million. The cold finishing mills have an annual capacity of 5000 tons of mixed semifabricated products; the hot mill, a much greater capacity. Hot

(*Please turn to Page* 82)

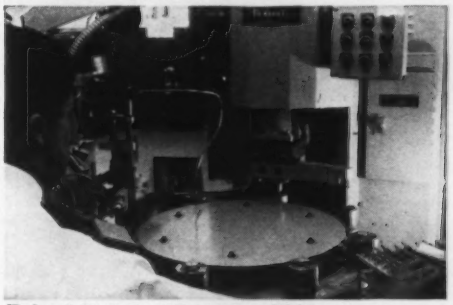
Warco
PRESS

Warco Press Line composed of three 400-ton straight side, eccentric gear presses forms automobile wheel "spiders" at The Budd Company's Detroit plant. Here, William F. Longfield, manager of press engineering and sales for McKay's Federal-Warco Division, looks over a finished wheel with Edwin Seiberlich, works manager, and R. O. Greenshields, plant manager.

Photo by ARNOLD NEWMAN



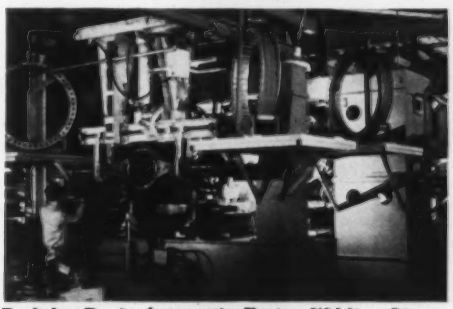
McKay Tube Mill Feed Line sends steel to the tube mill continuously at a rate of 1,800 fpm at U. S. Steel's National Tube plant at Lorain, Ohio.



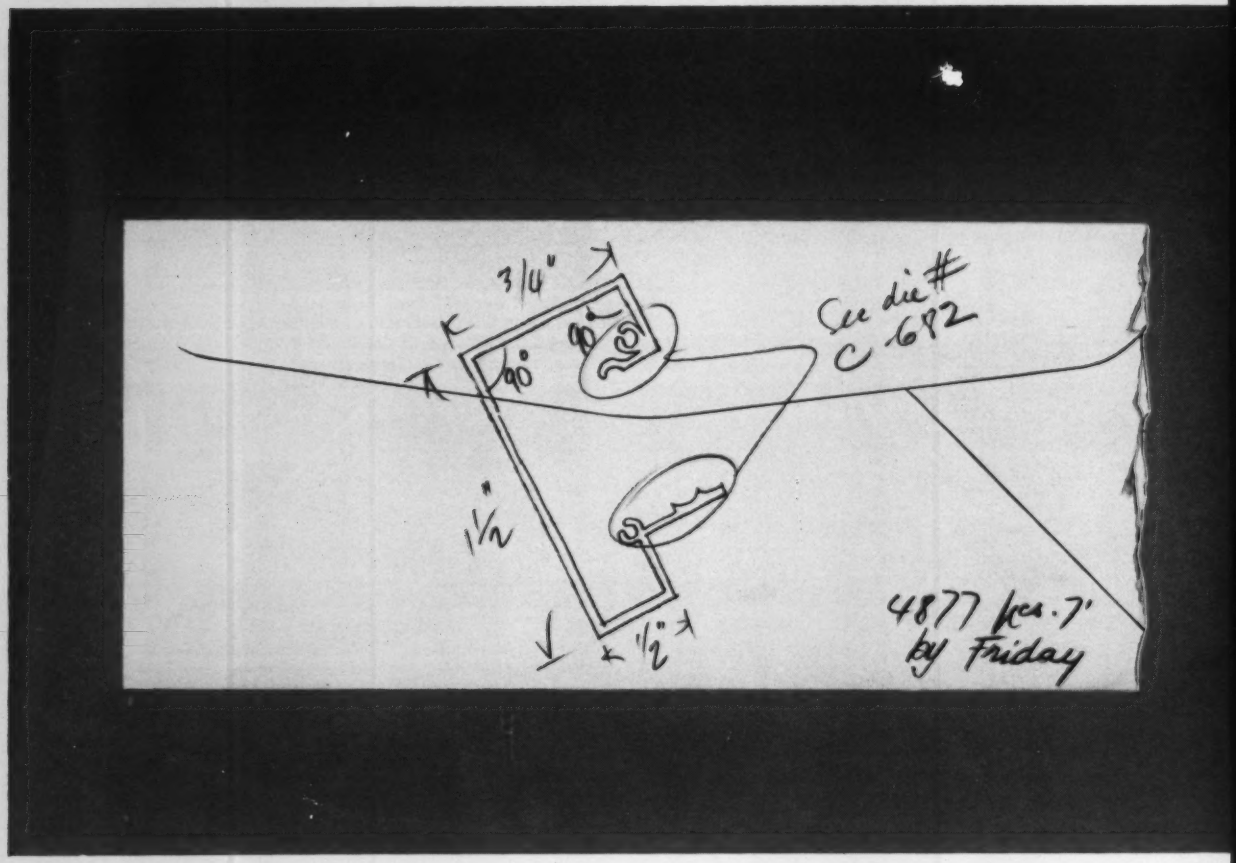
Federal Dial Feed Projection Welder, one of several used by the Bendix Corporation to weld transistor assemblies. It will weld 2,000 assemblies per hour with exacting precision.

Uncoiling, flexing, processing, slitting, shearing, feeding, forming, stamping, and welding . . . keeping ***metal in motion*** in the most economical manner possible, from coil to finished product, ***is the business of McKay Machine.***

McKay Machine, its divisions and subsidiaries produce the widest range of metal preparation, processing, forming and welding equipment available anywhere. Because of this they can design and build complete, integrated production lines of perfectly mated machinery. This makes it possible to achieve compactness and bring about efficiencies not otherwise practical. It also means the manufacturer is concerned with only a single source of responsibility and supply. That's why more and more cost-conscious metalworking firms are making it a point to know *The McKay Machine Company, Youngstown 1, Ohio.*



Berkeley-Davis Automatic Fusion Welding Lines, such as this one of two recently installed at American Metal Products Company in Detroit for the automatic production of over 200 sizes of motor vehicle axle housings, lead the industry in precision operation, production efficiency, and flexibility.



ORDERED MONDAY

with specs on the back of an envelope

YOUR nearby aluminum extruder is geared to provide fast service. Your order doesn't have to be big to be important to him. It doesn't have to wait for hundreds of others. And when it comes from his presses, delivery is quick, because your plant is close to his.

Speed is just one reason, however, for dealing with an independent extruder. *Quality* is another—the consistent quality of a specialist—the consistent quality of a supplier who takes a personal interest in your business.

Service is equally important. Your independent extruder is at hand when you need him. And he has the know-how to analyze

ALUMINIUM LIMITED

ALUMINIUM LIMITED SALES, INC.
111 W. 50TH ST., NEW YORK 20, NEW YORK

DELIVERED FRIDAY

5000 high-quality aluminum extrusions

your product line and show whether aluminum extrusions can now replace any costlier parts or assemblies.

You'll find that it's good business to get acquainted with one of these extruder neighbors . . . specialists who are supplied with top-quality aluminum ingot by Aluminium Limited.

ALCAN

Supplying metal and ideas to companies that work with aluminum.

Mail this coupon for Extruder names and addresses:

Aluminium Limited Sales, Inc. Dept. S-1204
111 W. 50th St.
New York 20, N. Y.

Please send me a list of Independent Extruders in this area.

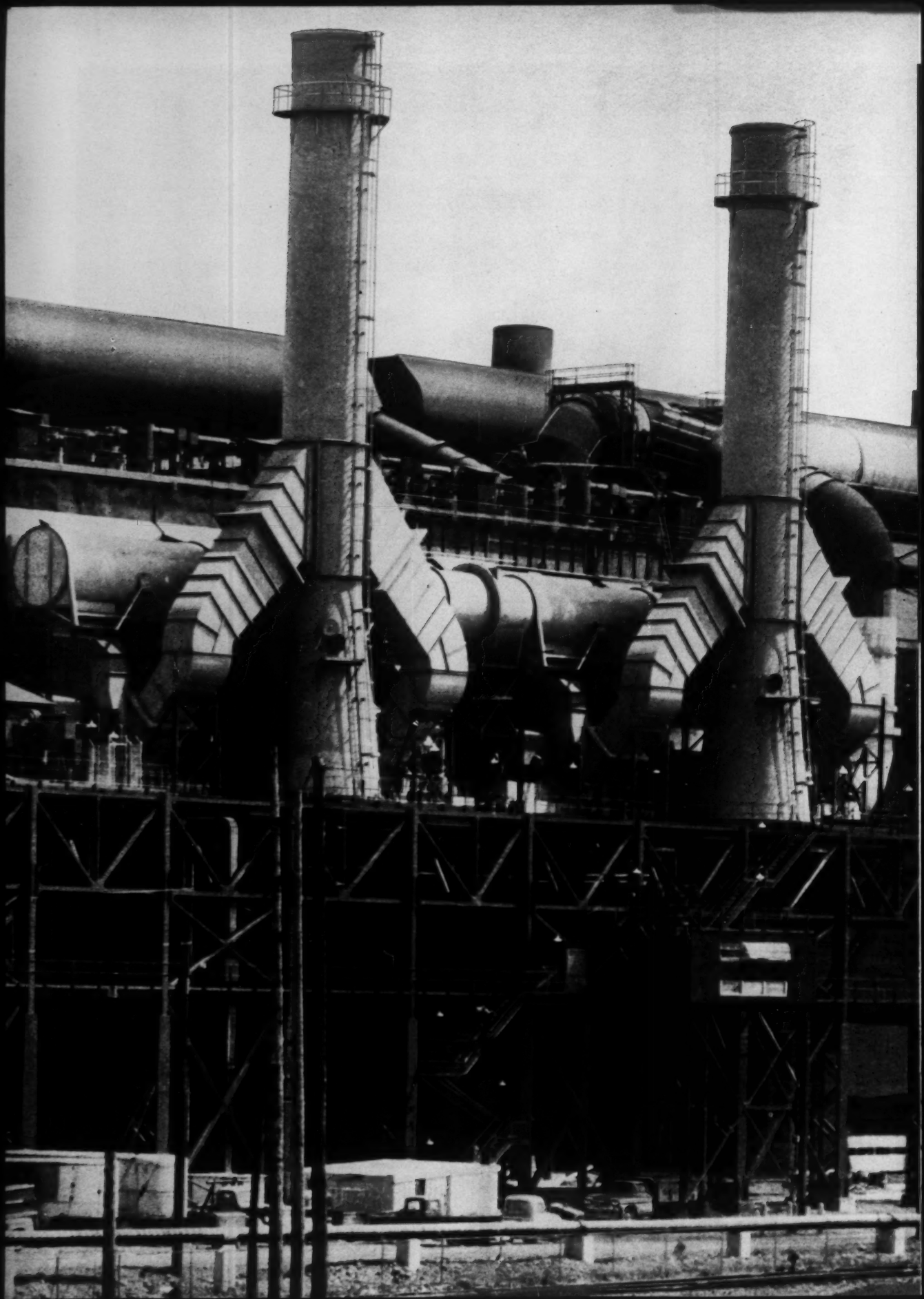
Name_____

Title_____

Company_____

Address_____

City_____ State_____



Oxygen-lance smoke eliminated at J&L Cleveland!

Western Precipitation's experience and "know-how" has solved one of the major problems resulting from the new high production oxygen steel making process—the billowing ore-laden red smoke from open hearths and converters.

The J&L system is a complete turnkey job, handled by WP from preliminary studies, through engineering, construction, and erection to operation. WP-Joy equipment integrated in the package includes electrostatic precipitators, complete flue work, Joy Rotating Diffuser fans, dust handling units, waste-heat boilers, and a complete control system. Total gas flow is approximately one million CFM.

This is another example of complete gas cleaning service to the steel industry by Western Precipitation, the leader in the field—with more successful installations than any other organization.

If you have a dust control problem, WP can solve it. For more information, or an answer to your particular problem, write Western Precipitation Division, Joy Manufacturing Company, 432 Oliver Building, Pittsburgh 22, Pa. (In Canada, write Precipco, 8285 Mountain Sights Ave., Montreal, P.Q.)

Dust and fume control since 1907

WESTERN PRECIPITATION

Los Angeles 54 • New York 7 • Chicago 4 • Pittsburgh 22 • Atlanta 5 • San Francisco 4

Division of Joy Manufacturing Company

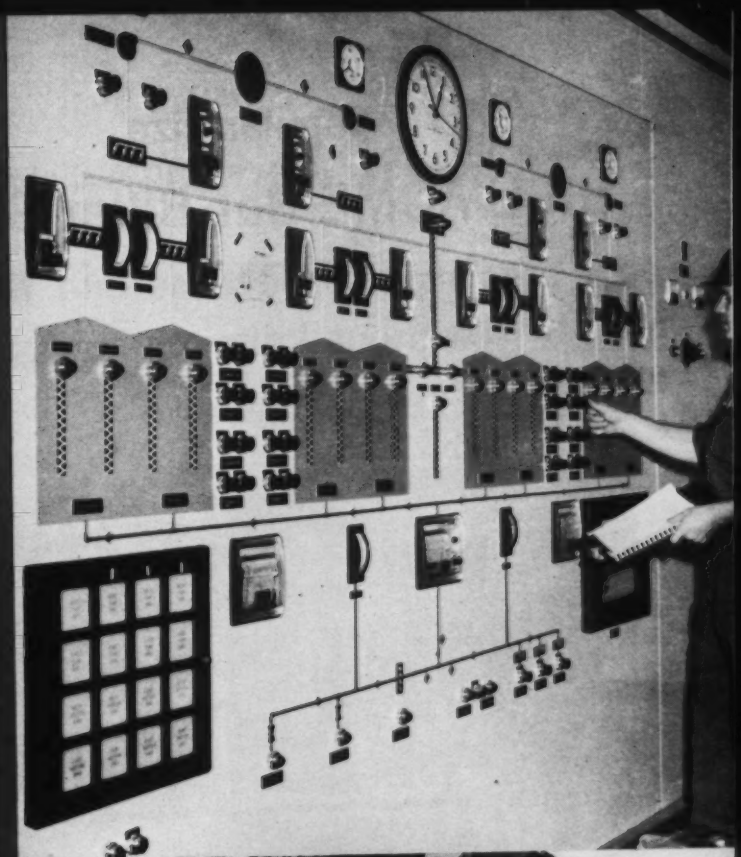
ELECTROSTATIC Precipitators
MULTICLONE Collectors
CMP Combination Units
DUALAIRE Jet-Cleaned Filters
THERM-O-FLEX Hi Temp Filters
TURBULAIRE Scrubbers
JOY-MICRODYNE Scrubbers
also: HOLO-FLITE Processors
HI-TURBIANT Heaters
TURBULEX Processors

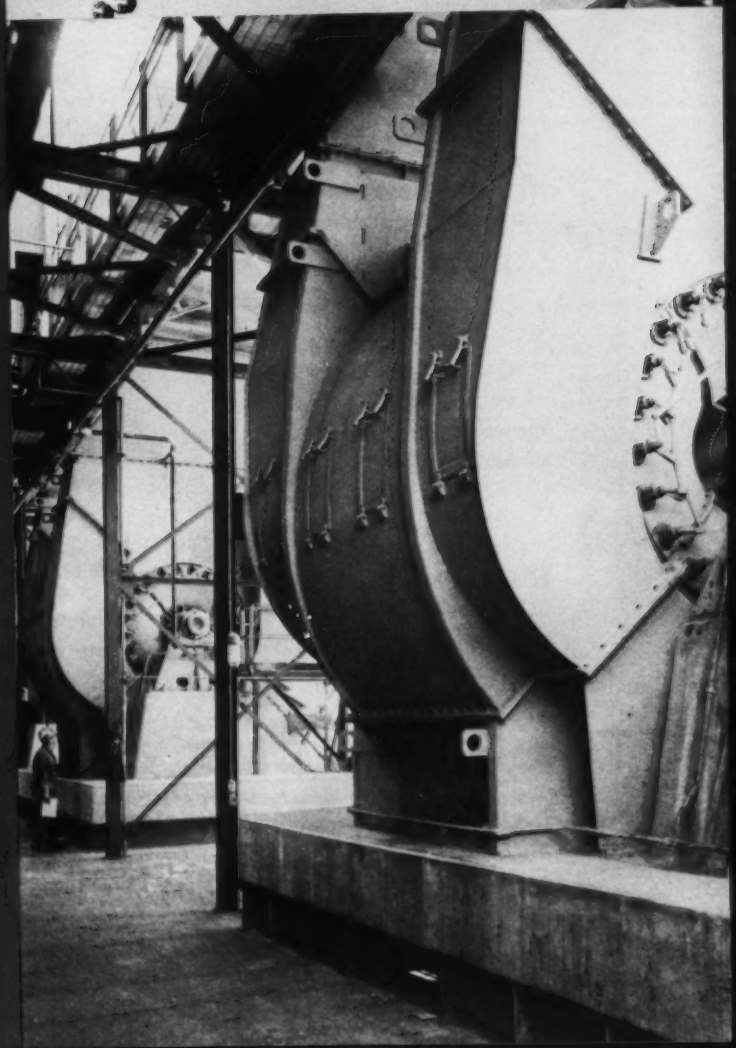
MEMBER OF INDUSTRIAL GAS CLEANING INSTITUTE

WP precipitator installation (left) towers 15 stories above J&L-Cleveland.

Control console (top right), a marvel of automation, enables one man to control the entire system from one point.

Joy Rotating Diffuser Fans (bottom right), part of the turnkey design by WP.

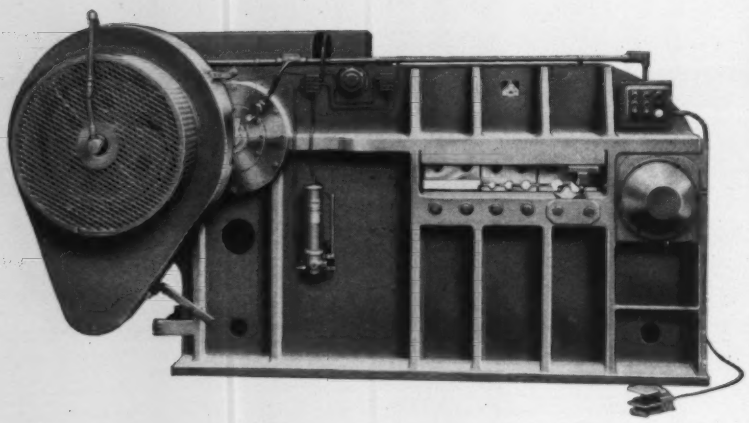




popular size

HILL ACME Bar-Billet Shear

cuts rounds, squares and flats without knife change



simple, rugged design

The Model 500 HILL ACME Bar-Billet shear has cutting capacity of 4½" in rounds or 4" in square mild steel. The basic principle of lever and fulcrum is employed for maximum efficiency with low power input.

versatile

With free running speed of 35 cuts per minute, high production is assured. The 36" knife permits cutting of rounds, flats, etc. without knife change. All models are available with fully automatic, semi-automatic or hand feed.

size range

HILL ACME Bar-Billet shears are made in a range of sizes to efficiently accommodate every commercial requirement. Bulletin BB-61 gives complete details.

The HILL ACME Company

Also Manufacturers of:

"CANTON" ALLIGATOR SHEARS • "HILL" HYDRAULIC SURFACE GRINDERS • "ACME" FORGING MACHINES • "CLEVELAND" KNIVES • MECHANICAL LIFTERS • "KLING" METAL WORKING MACHINERY

1201 WEST 65th ST., CLEVELAND 2, O.

(*Concluded from Page 75*)

rolling of ingots is done by a two high, 72 in. wide, reversing mill which is followed by a 60 in., four high, roughing and finishing mill.

Buffalo Plant Modernized

American - Standard Industrial Div., Detroit, American Radiator & Standard Sanitary Corp., is modernizing heat exchanger manufacturing facilities at its West Avenue plant in Buffalo. The division is placing increased emphasis on standardized heat exchangers as opposed to custom engineered units. An aggressive research and development program also has been initiated to improve existing lines and to develop new standardized lines.

Changes Sales Setup

World-wide sales of Harnischfeger Corp.'s P&H electric mining excavators are being consolidated under the Milwaukee firm's Construction & Mining Div. These appointments have been made: G. T. Raubach, manager of the Mining Excavator Div., Canada; J. H. Taylor, mining excavator sales manager, Western region; and C. A. Magnusson, Pittsburgh district manager.

Perkins Broadens Line

Perkins Machine & Gear Co., West Springfield, Mass., acquired the inventory of and engineering specifications for standard stock spiral bevel gears from Precision Gears & Products Inc., Paterson, N. J.

Marketing Group Formed

Parker-Hannifin Corp., Cleveland, has combined into an Industrial Group the product and marketing activities of related company divisions serving the industrial fluid power field. The new combine includes the Parker Fittings & Hose Div. and Parker Hydraulic Valve Div. in Cleveland, and the Hannifin Power Cylinder Div., Pneumatic Valve Div., and Hannifin Press Co. division at Des Plaines, Ill. R. W. Cornell, executive vice president of the corporation, is president of the Parker-Hannifin Industrial

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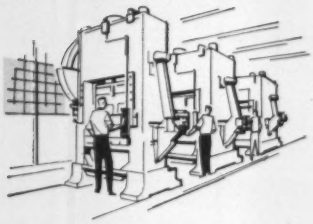
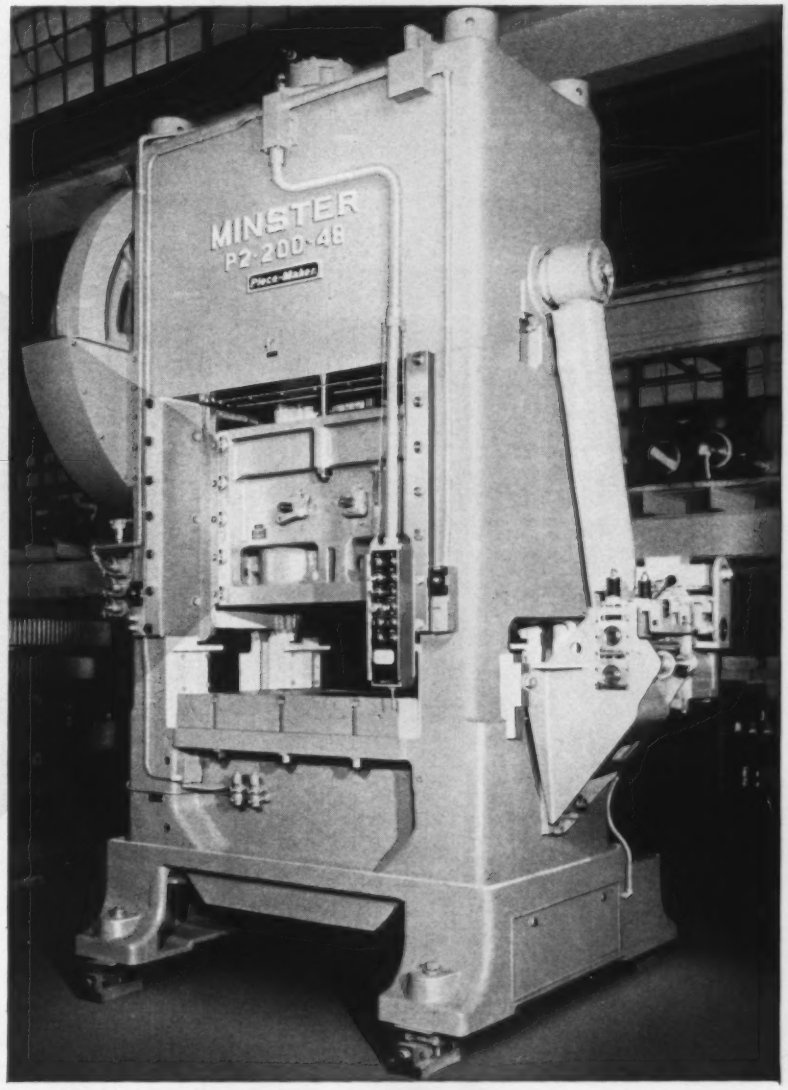


ANOTHER SATISFIED USER

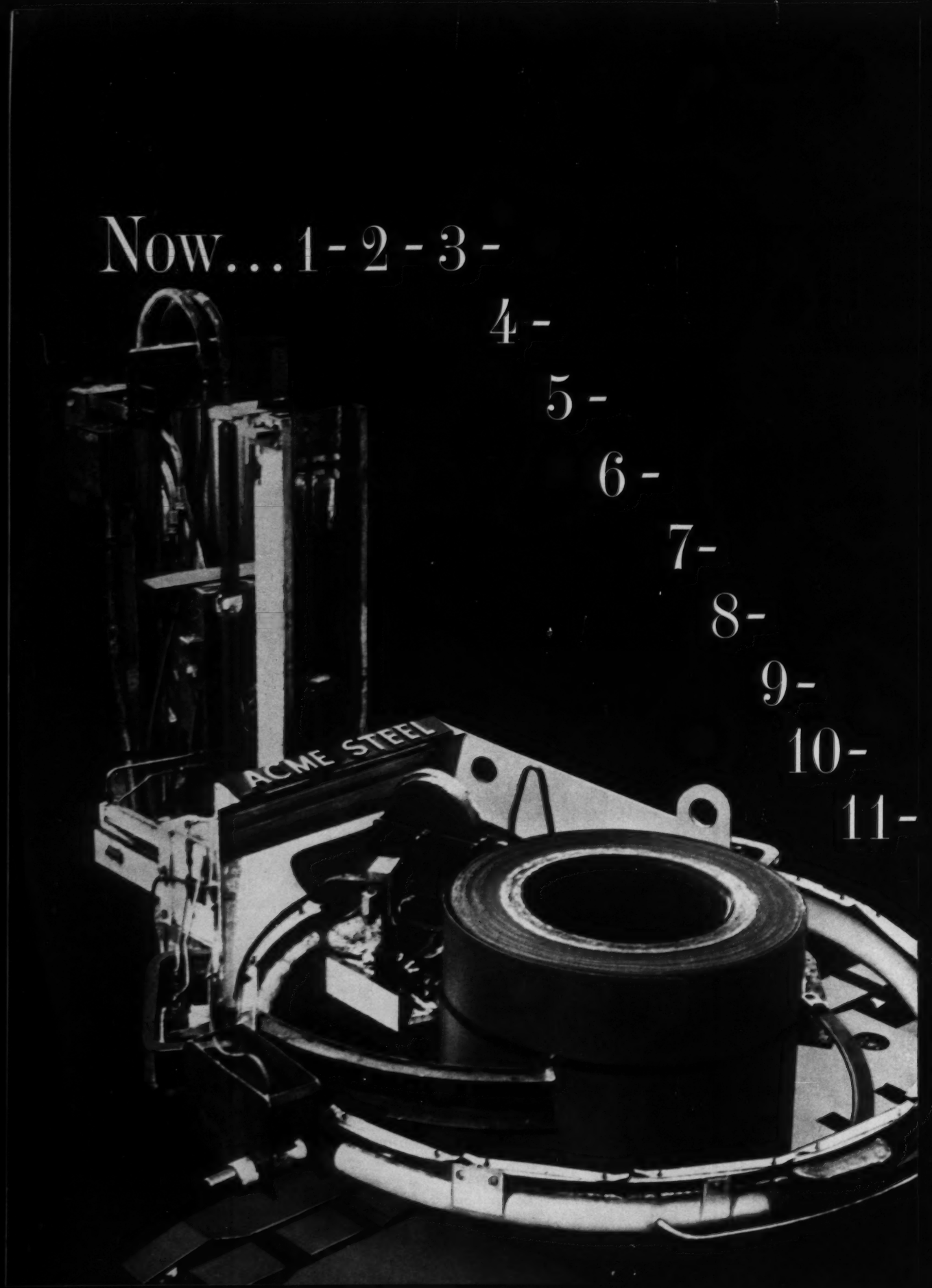


LAMINA-BRONZE WEAR PLATES

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN
Phone JOrdan 6-8711

Lamina-Bronze Wear Plates and their use are more completely described in Bulletin WP-59, send for your free copy.

The adjustable slide ways of this Minster press utilize Lamina-Bronze (electroplated bronze on steel) Wear Plates to assure long-life and free-running. In like manner, Lamina-Bronze wear surfaces are the best answer for any part that requires the non-seizing properties of bronze and the strength of steel.


Now...1-2-3-
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ACME STEEL

17 seconds to strap a sizzling coil!

The new F5 Strapping Machine is another industry "first" from Acme Steel. Here is one of five hot strip mill installations. This remote controlled F5 has *doubled* coil strapping production in addition to relieving two 2-man crews of a skin scorching task.

At the push of a button, it feeds and tensions the strap, then makes its own seals and shears the heavy-duty 1¼" strapping—all in about 17 seconds. Time, naturally, varies with the size of the coil.

Versatility is another virtue. The F5 can handle the full range of hot mill coils. It is custom designed for you. In addition to strapping horizontally as shown, other machines in hot coil production are strapping vertically and tying through the eyes. Other types of F5 installations include strapping cold coils and bundling sheet steel, bars, rods and structural roof joints.

Being basic producers ourselves, we face the everyday trials of getting steel products produced and shipped profitably. Our own plants were the testing grounds for the F5, as they are with other Acme Steel equipment. Engineering with first hand industry savvy is the basic reason why steel mills and fabricators using strapping equipment specify Acme Steel.

If you would like to see the 15 minute color movie we have prepared on this installation, call your local Acme Idea Man or return the coupon.

Another first from ACME STEEL IDEA LEADER IN STRAPPING

Another one of five F5 hot coil strapping installations.

Acme Steel Products Division, ACME STEEL COMPANY
Dept. SBS-121, 135th Street & Perry Ave., Chicago 27, Illinois

☐ I would like to arrange to see new F5 color movie.
☐ Have Acme Idea Man call with full F5 facts.

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City_____ Zone___ State_____

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BOX 501, DEPT. S-1261, DETROIT 32, MICHIGAN

(*Concluded from Page 82*)

Group. Otto J. Maha is vice president of the group; Don A. Cameron, vice president-sales. Carl J. Giblin heads the Industrial Group's Power Cylinder Div. in Chicago.

ASSOCIATIONS

National Machine Tool Builders' Association, Washington, elected these officers: President, F. J. Trecker, Kearney & Trecker Corp., Milwaukee; first vice president, W. E. Carroll, American Gage & Machine Co., Chicago; second vice president, W. K. Bailey, Warner & Swasey Co., Cleveland; treasurer, L. C. Gleason, Gleason Works, Rochester, N. Y.; and secretary, R. R. Baldenhofer, Thompson Grinder Co., Springfield, Ohio. Ludlow King was re-elected executive vice president.

American Institute of Mining, Metallurgical & Petroleum Engineers Inc., New York, elected these officers, effective Feb. 20: President, L. E. Elkins, Tulsa, Okla., Pan American Petroleum Corp.; president-elect, R. V. Peirce, Salt Lake City, Utah. Vice presidents will be: H. F. Beardmore, Houston, Gulf Oil Corp.; J. C. Gray, Pittsburgh, U. S. Steel Corp.; E. M. Kipp, San Francisco, Standard Oil Co. of California; Dr. C. C. Long, Monaca, Pa., St. Joseph Lead Co.; J. S. Smart Jr., New York, American Smelting & Refining Co.; W. B. Stephenson, Paoli, Pa., Allen-Sherman-Hoff Pump Co.

Mr. Stephenson was also elected president of the **Society of Mining Engineers** of AIME. E. G. Fox, Bituminous Coal Operators Association, Washington, was named president-elect of SME to become its 1963 president.

Dr. K. L. Fetters, Youngstown Sheet & Tube Co., Youngstown, will become president of the **Metallurgical Society of AIME.** R. C. Cole, White Pine Copper Co., White Pine, Mich., will become president-elect of the society.

Ernest W. Horvick has been named director of technical services for **American Zinc Institute,** New York.

THOMPSON

COLD ROLLED HIGH CARBON STRIP STEEL

THOMPSON WIRE COMPANY — THE QUICK SERVICE MILL

Dependable High Carbon Strip Steel—"dead soft annealed, full hard, or any hardness in between"—can be quickly shipped from MILLS STRATEGICALLY LOCATED TO SERVE YOU.

Modern equipment—controlled atmospheric annealing furnaces—Sendzimir and 4-Hi rolling mills equipped with X-Ray gauge controls—assures you of uniform hardness and accurate gauge throughout the coil.

A wide range of chemical analyses—.26% carbon to 1.35% carbon—Special Edges—round, square, beveled or varied shapes—plus people with years of High Carbon Strip Steel experience guarantee you the right steel for your specific job.

Write or phone today, you will find a sincere desire to be helpful at all of the Thompson "Quick Service" mills.

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CHICAGO, ILLINOIS • BOSTON, MASS.
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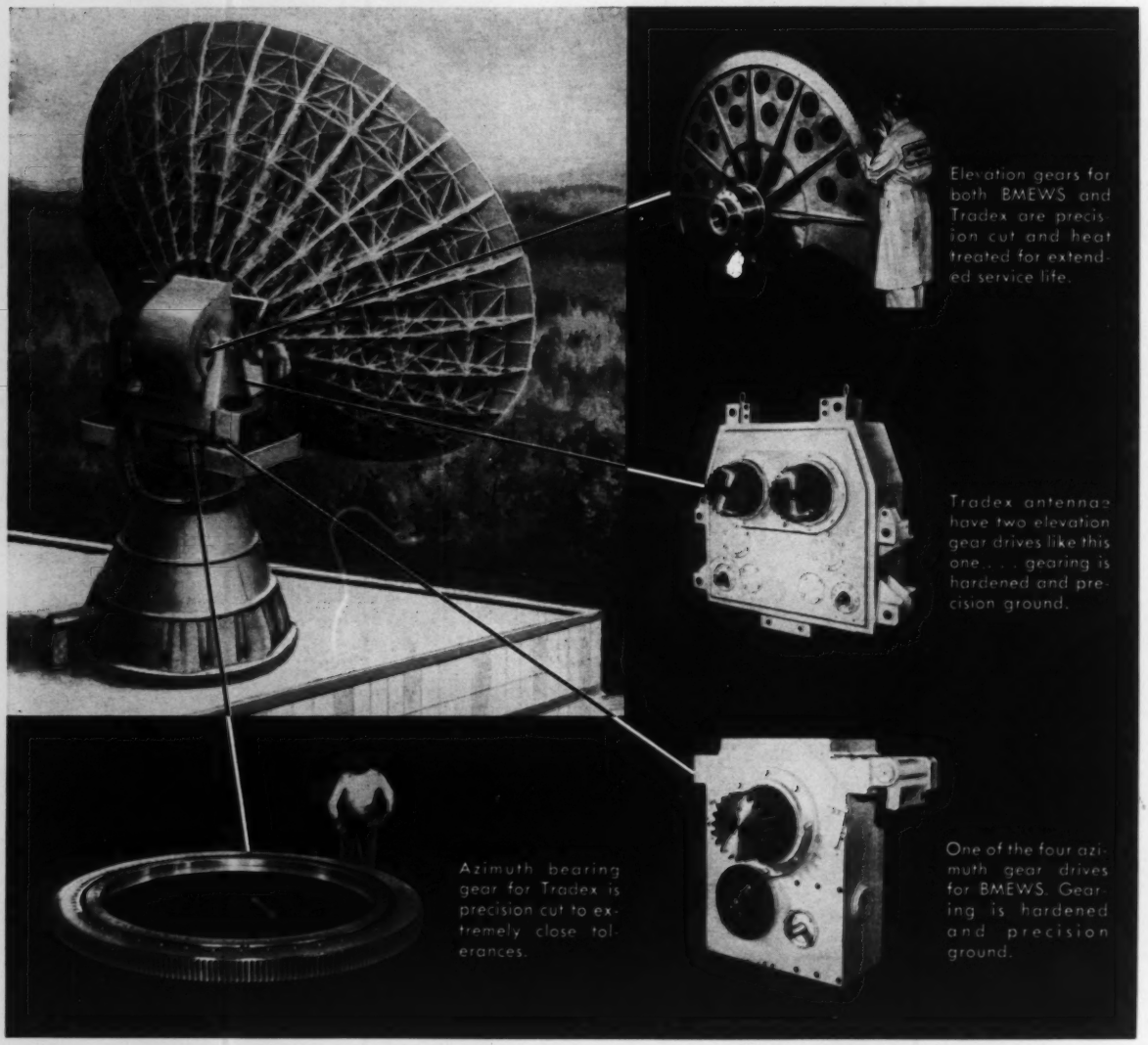
PHILADELPHIA GEARS AND DRIVES
power BMEWS and TRADEX antennae


Elevation gears for both BMEWS and Tradex are precision cut and heat treated for extended service life.
Tradex antennae have two elevation gear drives like this one . . . gearing is hardened and precision ground.
Azimuth bearing gear for Tradex is precision cut to extremely close tolerances.
One of the four azimuth gear drives for BMEWS. Gearing is hardened and precision ground.

When the giant radar tracking antennae for our ballistic missile early warning systems zero in on a 16,000 mph missile . . . and then hold it in dead center focus . . . there can be little margin for error.

The delicately sensitive, ultra precision movement of most of these big scanning dishes depends upon Philadelphia gearing and gear boxes.

Azimuth and elevation gearing is precision cut to extremely close tolerances. For installations involving severe loading cycles, the gearing is induction hardened to assure dependable long life and to maintain accuracy of teeth over an extended life period.

Rugged gear boxes are proportioned to critical stiffness requirements and gearing is precision ground throughout to assure minimum backlash and uniformity of performance from box to box. An added benefit is assured reliability over designed life expectancy.

Need a better solution to your gear and drive problems? Then write for our catalog, "An Advanced Concept in Modern Gears".

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AGMA MEMBER

Technical Outlook

ISRAELI STEEL— A new formula is reported to produce steel that is soft enough for inexpensive diemaking and machining but can be tempered to match the hardness of any known steel at a fraction of present costs. Called graphitizable, medium carbon steel, it is the result of three years' effort by Prof. Ariel Taub, Isreal Metals Institute, Haifa, Israel.

WELDING BERYLLIUM— Beryllco 25 or 165 is said to be an excellent filler metal for joining beryllium copper parts, claims Beryllium Corp., Reading, Pa. Weld strengths are said to exceed 95 per cent of the parent metal strength before aging or annealing.

GAS BEARING TURBINE— A miniature, helium expansion turbine has journal bearings lubricated by gas instead of the roller types normally employed. Bearing life is expected to be indefinite and shaft speed is limited only by the strength of the material, states the National Bureau of Standards, Washington.

IMPROVED ELECTRICAL COPPER — An improved powder process cuts the costs of electrical grade copper parts by about 10 per cent, claims Fansteel Metallurgical Corp., North Chicago, Ill. Conductivity is about 93 per cent as good as that of wrought copper, the firm states.

TUNGSTEN SEMICONDUCTORS—The ability to cut precise discs from wrought rods rather than rolled sheets is said to improve uniformity and density of tungsten semiconductors. Fansteel also claims wafers can be cut down to 0.020 in. thick.

DESIGN FOR ERROR—Designers must allow for the fact that mechanical testing machines are not too accurate when loads are rapidly applied (dynamic loading), claim R. W. Fenn Jr. and A. A. Moore of Dow Metals Products Co., a division of Dow Chemical Co., Midland, Mich. For such cases, they have worked out a technique for determining the point at which gross errors occur in stress and strain measurements. (A subcommittee of the American Society for Testing & Materials, Philadelphia, is seeking techniques for dynamic calibration.)

COLD STEEL— A modified carbon steel halved the cost of four, refrigerated, carrier tanks for liquid, anhydrous ammonia, claims Phoenix Steel Corp., New York. Cost of the modified steel is less than $200 a ton. Performance is said to equal that of some low temperature alloys.

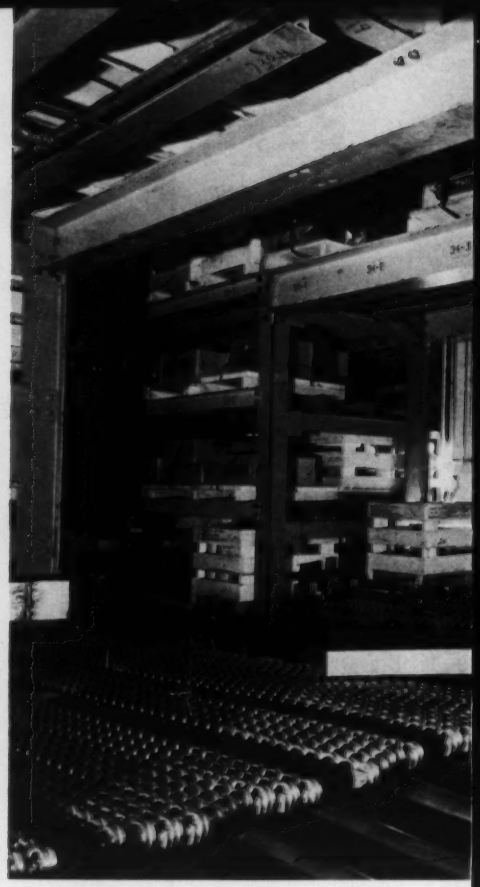
BRAKE RETARDERS— On Pacific Coast hauls, look for brake retarders on trailers instead of trucks, states an authority. (Retarding forces are applied through hydraulic impellers instead of friction.) Expected results: Better braking control with relatively little additional cost.

VACUUM DEOXIDIZES STEEL— The question of how vacuum arcmelting removes oxygen from steel intrigues Russian scientists. Their conclusions: Oxygen is removed mostly in nonmetallic inclusions from well deoxidized consumable electrodes; mainly as carbon dioxide from electrodes which contain a comparatively large amount of oxygen. Degree of deoxidation depends on intensity of gas evolution (boiling and agitation) rather than carbon activity, the Soviets believe.

MHD POWER SEARCH— The National Aeronautics & Space Administration is building at Cleveland a cryogenically cooled, air core magnet for magnetohydrodynamics (MHD) studies. The magnet is expected to produce a 200,000 gauss field in a space about 1 by 3 ft. MHD has possible applications as a propulsion system for space.

ELECTRICAL COAL— A type of magnetohydrodynamic (MHD) generator under study would employ coal as a source of ionizing gas, states Armour Research Foundation, Chicago. Ash, normally a deterrent, contains certain alkalies which would aid ionization.

After assembly, products are palletized, a punched card showing storage location is attached, and the pallet is moved to an elevator conveyor



Once elevated,

Random Storage Technique Expands Warehouse Space

• **SUBSTANTIAL operating savings, smoother manufacturing flow, better space utilization: Westinghouse Electric Corp. hopes to realize those benefits from a random cubicle storage setup at its Transformer Div., Sharon, Pa.**

The system, which cost about $1,150,000, enables the division to consolidate warehousing of raw materials and finished products under the same roof with the manufacturing operation. The installation was made by American Monorail Co., Cleveland.

Formerly, with zone storage, Westinghouse found it necessary to use outside warehousing 12 and 14 miles away (at Transfer and Camp Reynolds, Pa.). A lot of movement was involved. For example: $2.5 to $5 million worth of material was moved in and out of Camp Reynolds each month.

With random stacking, 110,000 sq ft of space does the same job as the 310,000 sq ft previously required with zone storage techniques, says S. E. Lauer, manager, purchasing and traffic. Any plant that's cramped for space can increase its warehouse facilities with random stacking techniques, Mr. Lauer adds.

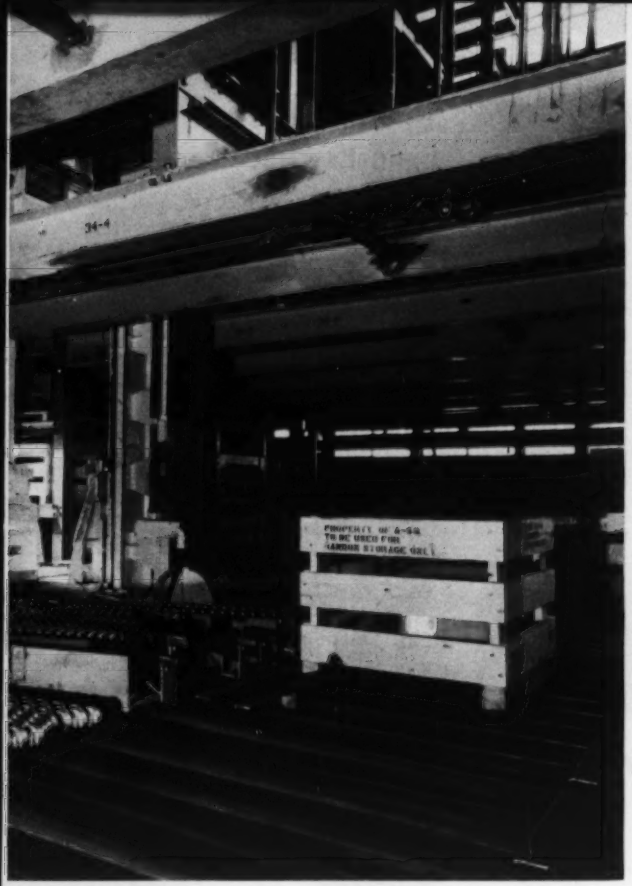
• **Shipping, receiving, and stores are combined in one area.**

Purchased items are inspected, repackaged, and reskidded. (The system requires that everything be palletized). Materials to be stored (raw materials and finished products) are placed in cubicles by stacker cranes.

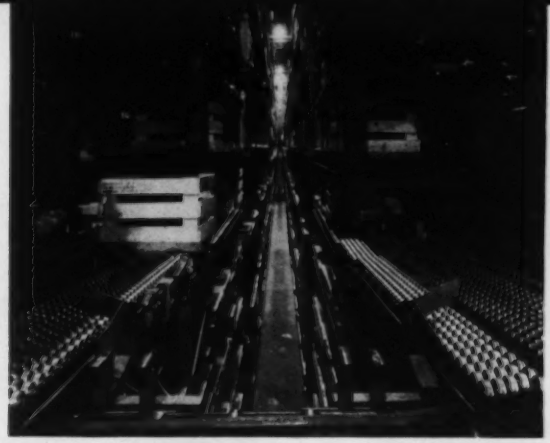
The stackers are elevators that traverse the storage aisles laterally and longitudinally. Cubicles that range from the floor level to the 31 ft ceiling can be easily reached. All movements of the stackers are operator controlled. Eight stacker cranes service the storage area.

The storage area is a 110,000 sq ft rectangle. Each end has a two level conveyor system. At the shipping and receiving end of the storage area, the top level accepts inspected, repackaged, purchased material. The lower level serves as a dropoff point for finished products that are being shipped.

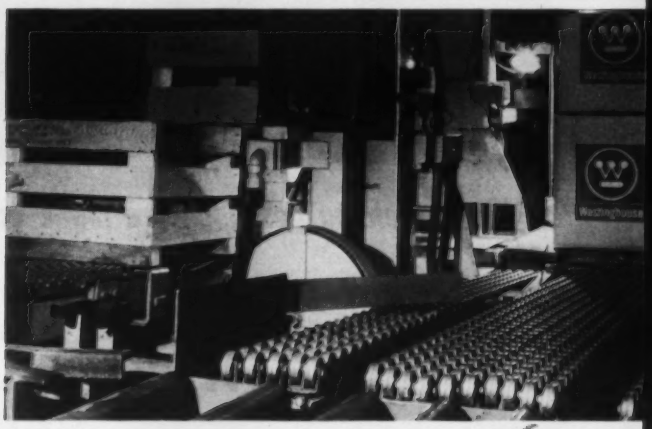
The other end of the storage area is contiguous with the division's transformer assembly operation. As-



the pallet moves along a conveyor . . .



. . . Until it's pushed off at the correct aisle checkoff point by kickoff arms—they are controlled by electric eyes that read the aisle location on the punched card

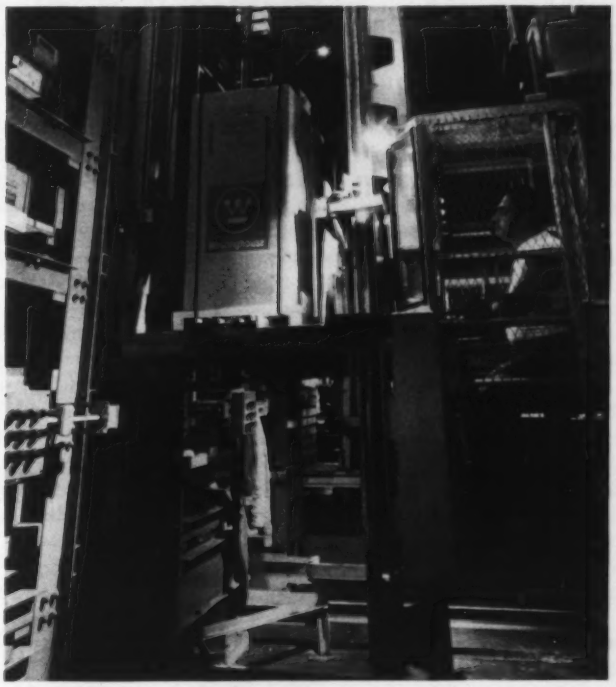


A stacker crane picks up a palletized load . . .

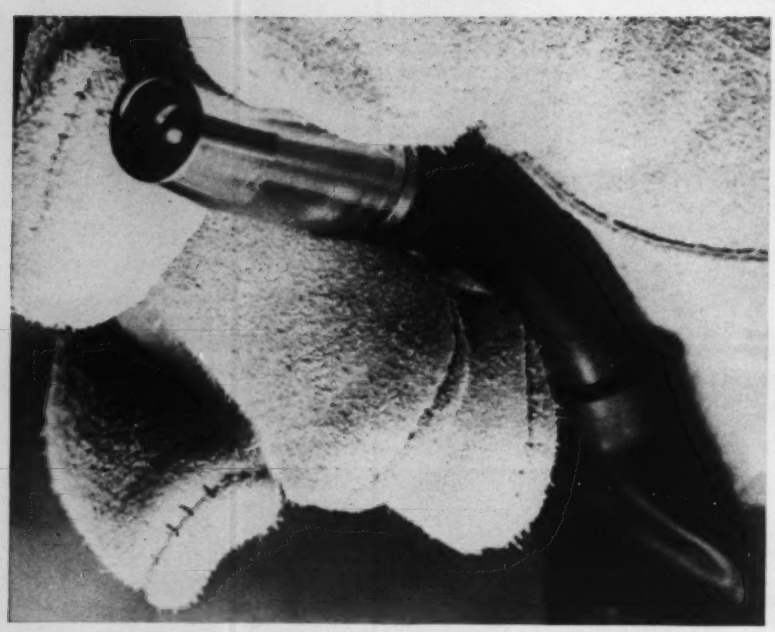
sembled transformers (in pallets) are elevated to the top conveyor system where electric eyes at each aisle check the IBM cards on the pallets for aisle routing. Pusher arms are activated when the pallet comes to the right aisle. Parts going out to assembly are unloaded onto the lower conveyor where lift trucks from assembly pick them up.

• The location of material in storage is controlled by an IBM card file and sorting system.

Each storage cubicle is identified by a location or address number. Material in storage is recorded on an IBM card carrying the material identification and storage cubicle address number. The exact location of any item in storage can be determined in seconds. The correct address card for any item is automatically selected by the IBM sorting equipment. Then the stacker crane operator merely moves the crane to the proper location and removes the material mechanically.



. . . And delivers it down the aisle (side view) to the cubicle indicated by the punched card on the pallet



Difficult welding positions are made easier as . . .

22 Ounce Welding Torch Lightens Operator's Job

• A FEATHERWEIGHT (22 ounce) welding torch is said to double operator speed in working difficult welding positions.

The torch, developed at Westing-Arc Dept. (Buffalo) Westinghouse Electric Corp., has wire feed, works in all positions. It's air cooled. Westinghouse says it was engineered to meet the need for welding mild and stainless steels and aluminum in the light gages.

Rated 100 per cent duty cycle at 200 amperes, the torch accommodates wire sizes from 0.030 to 0.047 in. It can be used with CO_2 in the reactor and spray ranges, with argon or argon gas mixtures in the reactor range.

• Welding speed is attributed to ease of rotation.

A special nozzle seat design allows the operator to rotate the nozzle 360 degrees with respect to the handle.

Cables and hose for the torch are enclosed in a single, neoprene sleeve to ease handling. The cables-hose package is 15 ft long, giving half again as much reach as available in comparable equipment, the company claims.

The new wire drive system has a range of 90 to 424 ipm with standard gearing, and can be modified to provide speeds up to 1170 ipm when desired.

The torch is the business end of Westinghouse's new, portable, semi-automatic welding system. The package (mounted on a steel wheeled running gear) includes the torch, wire feed control; and a 200 ampere, silicon diode, constant voltage, rectifier power source with built-in reactor. The power source of the SA-200 welder has a range of 9 to 40 volts.

Throwaways Trim Machine Builder's Order Backlog

A WIDE discrepancy in tool performance turned out to be a blessing to a machine tool builder. The discrepancy came in turning 90 in. diameter, cast iron, machine bases.

Goaded by a backlog of machine orders, production men turned to a carbide engineer for help. Machining time on the 7½ ton bases was 40 to 45 hours. Most of the turning is interrupted by openings in the casting. Depth of the initial cut ranges from zero to 1 in. because of considerable runout.

Brazed tip tools were run at 0.010 and 0.015 in. feed and a maximum of 190 sfpm. Now, heavy duty Kennametal insert tools are run at twice the original feed and two and a half times the surface speed.

Savings are figured at $202.50 per casting, based on $13.50 per hour machine burden. Not included are additional savings from the elimination of tool regrinding.

Magnesium, Diecast Blades End Noisy Blower Problem

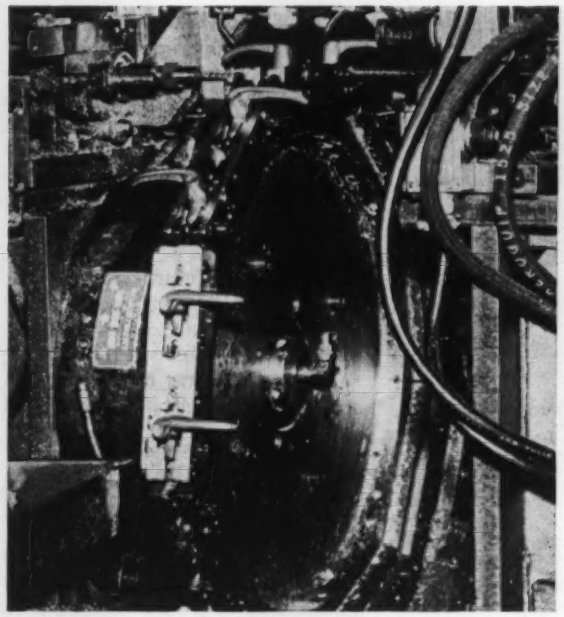
RANDOM spaced blades, diecast in magnesium, eliminated the problem of noisy operation on blowers for heaters installed in 1962 Dodges and Plymouths.

Lightness and cost were the most important factors in the choice of magnesium for the parts, says Chrysler Corp., Detroit.

Eleven bladed rotors and ten bladed stators are produced by Doehler-Jarvis Div., Toledo, Ohio, National Lead Co. The blowers are miniature, single stage, axial compressors like those in jet engines.

In the stator, the 360 degrees of the circular frame are divided into ten spaces ranging from 34½ to 37½ degrees. Adjacent intervals are unequal. In the rotor, which an electric motor turns at speeds up to 4200 rpm, spacings of 32 or 33 degrees are placed in random sequence.

Doehler-Jarvis diecasts the parts to the following tolerances: ±0.005 in. within true blade profile, ±0.002 in. permissible variation on three place linear dimensions, ±0.010 in. on two place dimensions, and a 15 minute variation of angular dimensions and draft angle.



Hubs on diecast window ventilator handles are crossdrilled. If necessary, they are spotfaced in this Bellows indexing setup. Drills are air operated

Two crossholes are drilled in the hubs of the diecast window regulator handles. Bellows equipment controls indexing, drilling, and hold-down

Indexing, Drilling by Air Speed Handle Output

• PROBLEM: Find fixturing and machine setups that will provide fast, low cost machining (including drilling) on door regulator and window handles diecast in zinc.

• ONE ANSWER: Air operated indexing setups that are nearly automatic. (Loading is by hand.) Crosshole sizes and locations are precise.

The handles are produced and finished in large lots by Univex Die Cast & Engineering Co., Dearborn, Mich. Each handle has a hub in which a square hole with beveled corners is cored. One or two crossholes must be drilled through hub walls for fastening pins. Hole diameter must be held within 0.003 in.

• One setup uses a Bellows, nine sided fixture that is indexed in a vertical plane.

Two ventilator window handles are loaded and automatically clamped in each of the nine fixtures. Each hub hole fits over a mating locator pin that is previously crossdrilled to clear the drills for the castings. The fixtures accommodate right and left handles.

After loading at a front station with the cam projection in a slot, the fixtures index to position where air operated drills are advanced right and left through fixture bushings. A cylinder on a bridge above the drilling position operates twin holddowns. (A milling station can be added at this point for another type of handle.) After operations at the top station, indexing continues; clamps unlock; and castings drop out below the dial. A chip blowout occurs at a front station just before each fixture is reloaded.

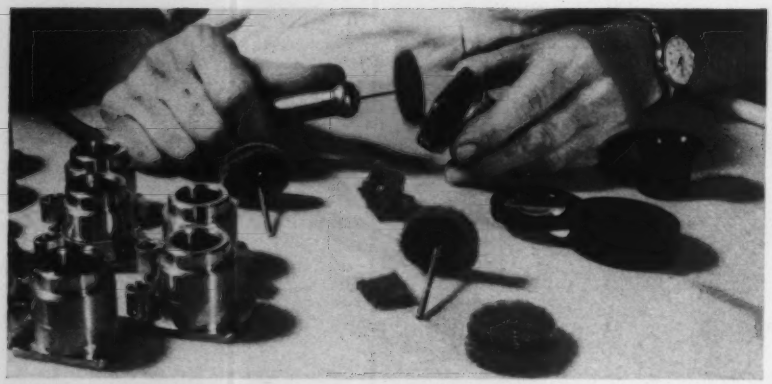
The setup drills 1200 castings an hour.

• In another indexing setup, regulator handles have hubs crossdrilled with two radial holes whose axes are at right angles. (The drills pass through both walls of the hub.)

A horizontal, Bellows dial is used. Other motions are done by plungers in Bellows cylinders. Location is again on square pins having clearance crossholes.

Hand loading is done at a front station. Handles are placed in separate fixtures (each with its own two pilot bushings with axes at right angles). When indexing brings handles into the two successive drilling stations at the back of the dial, hold-down plungers lower automatically to seat the lower end of each hub so holes will be drilled at correct height.

Air blowout helps eject the handles into a chute. The setup completes the drilling of two holes at a rate of 1200 handles an hour. Except for hand loading, it is automatic. An air jet set in advance of the loading station blows chips out of the fixture about to be loaded.



Carbide impregnated, nylon fabric disc removes burrs from stepped steel cylinder

Nylon Abrasive Discs Pass Critical Deburring Test

Abrasive fabric is used on parts for missiles, aircraft, and machine tool controls

• LOOKING FOR a way to remove machining burrs from small parts without exceeding critical dimension tolerances? You may want to try an abrasive technique that proved successful on miniaturized parts for missile guidance systems at Moog Servocontrols Inc., East Aurora, N. Y.

Discs of nonwoven, nylon fabric impregnated with an extremely fine carbide abrasive are used. They are driven by die grinders at 60,000 rpm. The technique is said to make possible the holding of tolerances as tight as 10 millionths of an inch.

• Flexible, nylon discs conform readily to stepped or tapered holes and threaded areas.

Internal diameters are finished smoothly without disturbing critical dimensions, says Jack Stacey, a supervisor in the deburring section. And workers are able to develop precisely the desired radiuses on stepped holes or similar areas.

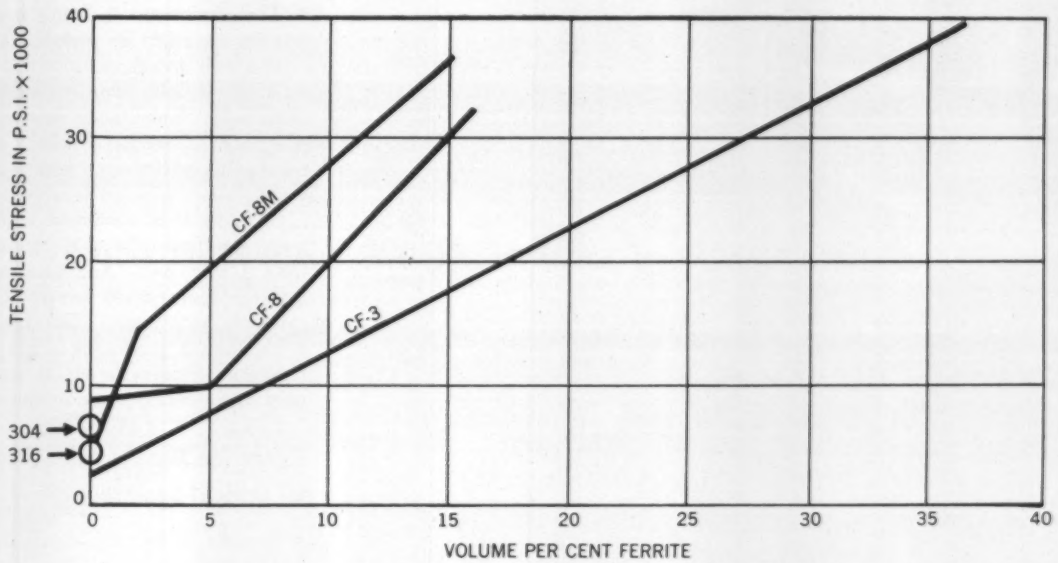
Tolerances are usually 50 to 200 millionths of an inch, but 10 millionths is often required. Deburring is inspected with magnifiers and go-no go gages. Reject rates have been extremely satisfactory and rework has been reduced considerably since the deburring section standardized on the nylon abrasive, says Lee Briggs, a Moog production superintendent.

Previously, the deburring was done by hand with dental tools. On one operation, the rate was ten parts per hour and the slip of a dental file could reduce a $350 component to scrap. Current rate on the same part is 245 per hour and the finish is improved.

• Discs in desired sizes are cut from material purchased in rolls.

The abrasive material, called Bear-Tex, is supplied by Behr-Manning Co., Troy, N. Y., a division of Norton Co. It comes in 30 ft rolls, 4 in. wide and about 3/16 in. thick, in medium density and extremely fine grades. Discs (or squares) are die punched as they are needed.

Disc diameters are chosen to exceed hole size, so the disc assumes a cone shape as the tool enters the hole. That provides a virtual lapping action on aluminum or stainless steel parts.



	Carbon	Manganese	Chromium	Nickel	Molybdenum	Silicon
CF-3	0.03 max	1.50 max	17-21	8-12	— —	2.0 max
CF-8	0.08 max	1.50 max	18-21	8-11	— —	2.0 max
CF-8M	0.08 max	1.50 max	18-21	9-12	2.0-3.0	2.0 max

Ferrite Content Cuts Stress Corrosion Cracks

• MAGNETISM and ferrite content are not necessarily related to the corrosion resistance of stainless type steels.

That finding comes from a research program just completed at Ohio State University, Columbus, Ohio. Sponsor: Alloy Casting Institute. The tests show that an appreciable amount of ferrite in the 18-8 types (which makes them magnetic) does not harm corrosion resistance. On the contrary, the ferrite contributes to resistance against stress corrosion cracking, the researchers conclude.

• The higher the ferrite content, the better the resistance to stress corrosion cracking, the experiments indicate.

The curves, based on samples exposed for 8 hours to condensate from 875 ppm chloride water at 400° F, show that the stress required to induce corrosion cracking in the three alloys increases with the percentage of ferrite in the microstructure.

The program was started because of the known stress corrosion resistance of ACI grade CD-4MCu, a cast, precipitation hardening alloy developed several years ago under the sponsorship of the institute. The ferritic alloy has exhibited good results in service, ACI reports.

• Three alloys (CF-3, CF-8, and CF-8M) were used in the study.

The nature of each alloy determined its stress corrosion resistance under the conditions of the test, but all showed an improvement with higher ferrite content. As the graph demonstrates, the amount of gain in tensile stress was proportional to the ferrite content, except at low ferrite contents.

• Ferrite-containing alloys have held up well in service.

The CF-8M alloy has been used in equipment exposed to high chloride ion concentrations. Typical castings in such service contain 10 to 15 per cent ferrite. Pumps made of CF-8M are used to handle brine solutions carrying suspended salt crystals. The pumps have seen service as long as ten years, a substantial improvement over materials previously used.

X-Ray Analyzer Applied In Operations Laboratory

• A VACUUM, x-ray, fluorescent spectrograph has speeded metallurgical analyses at National Alloy Div., Blawnox, Pa., of Blaw-Knox Co., and they're more accurate than those obtained by the wet chemistry previously employed.

The analyses insure production of ferrous and nonferrous heat resistant and corrosion resistant alloys to specifications in the firm's five, electric arc furnaces. Their capacities range up to 2000 lb per hour.

• The x-ray machine analyzes material in a fraction of the time formerly required.

"Using the wet process, operation of the division's electric arc furnaces was slowed because of the sometimes lengthy laboratory work," says H. N. Ornitz, vice president and general manager. "Now we have eliminated that delay, reduced alloy loss and power consumption, and extended refractory life."

Wet tests for tungsten previously took 3 hours. The x-ray spectrograph, supplied by North American Philips Co. Inc., New York, completes such a test in seconds.

• The equipment is being used to test for a variety of metals.

The unit speeds quantitative tests on alloy samples from furnaces, determining percentages of silicon, phosphorus, sulfur, nickel, chromium, molybdenum, and columbium.

Error in reproducibility with the x-ray equipment is said to be less than 1 per cent. And accuracy is said to increase in proportion to element percentage. The machine is capable of producing a graph of radiation intensity, which can be used as a permanent analysis record.

Operation Analogous to That Of Optical Spectrograph

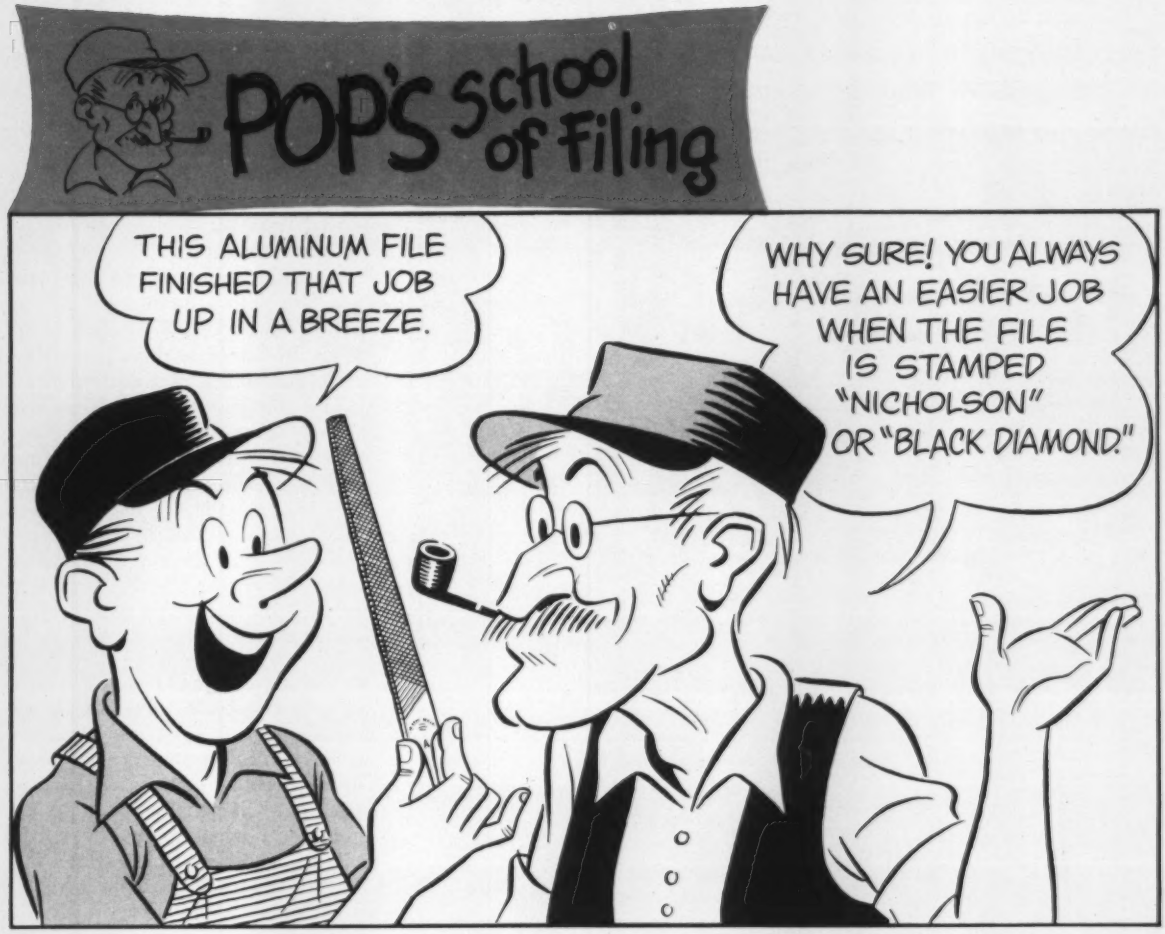
• Samples from the furnaces are cut to ½ by 1¼ in., then ground, polished, and inserted in the bulk specimen holder for the spectrograph. Controls are set by a laboratory technician, and the sample, which is irradiated by an intense x-ray beam, emits characteristic x-ray spectrums. Secondary radiation passes through collimating, parallel foils to an analyzing crystal.

• The crystal is oriented to present a selected atomic spacing, which reflects characteristic wave lengths at given angles. Rotation of the crystal causes characteristic wave lengths to pass into a detector, which is rotating at half the speed of the crystal.

• The analyzing crystal of the spectrograph acts as a diffraction grating (resolving and dispersing various wave lengths) in much the same way an optical grating handles visible and ultraviolet radiation in an optical spectrograph. Various wave lengths are separated by the crystal, so that each is individually detected for intensity measurement.

• Quantitative analysis is based on the proportional relationship between characteristic radiation intensity from a particular element and the percentage of the element present in the sample after findings have been compared with standards of known concentration.

• Spectrum intensities are recorded on a strip chart synchronized with the crystal scan. The chart position of spectrum peaks identifies the element, and amplitude or intensity indicates the percentage present.


POP'S school of Filing
THIS ALUMINUM FILE FINISHED THAT JOB UP IN A BREEZE.
WHY SURE! YOU ALWAYS HAVE AN EASIER JOB WHEN THE FILE IS STAMPED "NICHOLSON" OR "BLACK DIAMOND."

The Nicholson or Black Diamond file for aluminum is typical of our line of special purpose files. Each file in the line is designed for a specific job (in this case, finishing a very soft metal without excessive clogging). Like all of our files, each special purpose file is made under the most rigid quality control . . . and by exclusive machines that Nicholson engineers designed and built.

No matter what file your work requires, no matter how many file types you need, use* the file that has been the standard of excellence throughout the world for many decades . . . Nicholson or Black Diamond. Call your Industrial Distributor today.

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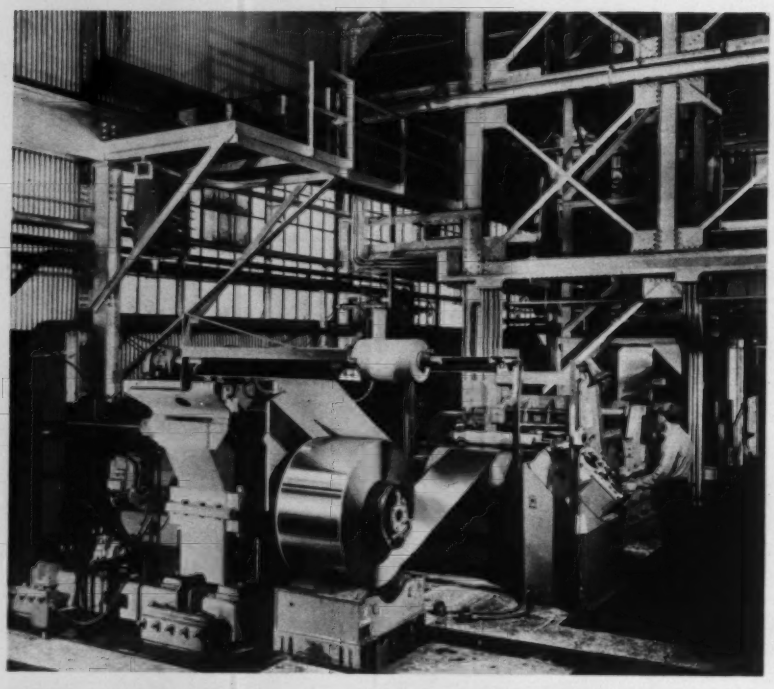
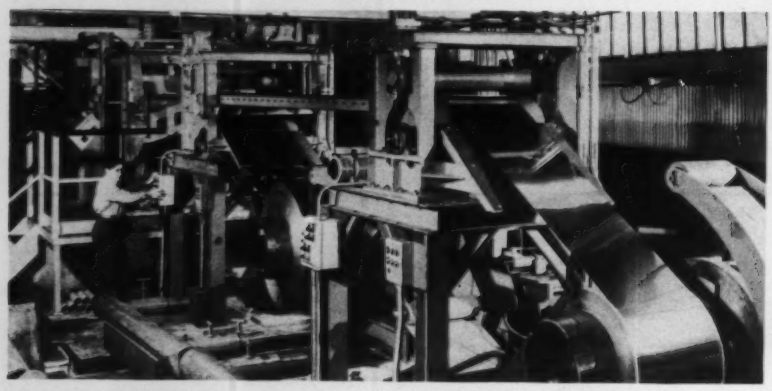


Cold rolled coil enters the annealing line . . .



It is still shiny when it reaches the recoiler

Bright Annealing Process Uses Tower Type Furnace

• YOU CAN get stainless steel strip that requires little or no buffing after forming.

Example: A tower type, continuous annealing furnace provides proper stress relief in stainless steel produced at Sharon Steel Corp., Sharon, Pa. And the product is said to come out of the furnace as bright as it was when it came off the cold mill.

Availability of the bright annealed material in larger quantities is expected to increase its use.

• Tensions developed during cold rolling are removed from the steel without damaging its delicate finish.

"Careful control in hot and cold rolling is the secret of success in producing bright stainless strip," says Sharon. "But cold rolling creates tensions that must be removed from the steel before it goes to the fabricator. For example: Type 430 stainless comes from the cold mill with a hardness of 100 to 104 Rockwell B. We soften it to about 78 Rockwell B to give it the right formability."

The company's bright annealing line is designed to relieve rolling stresses without scarring or scaling of the product. (See STEEL, May 9, 1960, p. 148.) The furnace, which was supplied by the Industrial Heating Dept., Shelbyville, Ind., of General Electric Co., was installed by Sharon personnel, with help from GE engineers.

• The tower type furnace speeds annealing and minimizes floor space requirements.

The vertical arrangement of heating and cooling sections of the furnace makes it possible for material, after "dead-heading" to the upper roll, to pass downward, through the heating and cooling zones, without touching any rolls until it's cool.

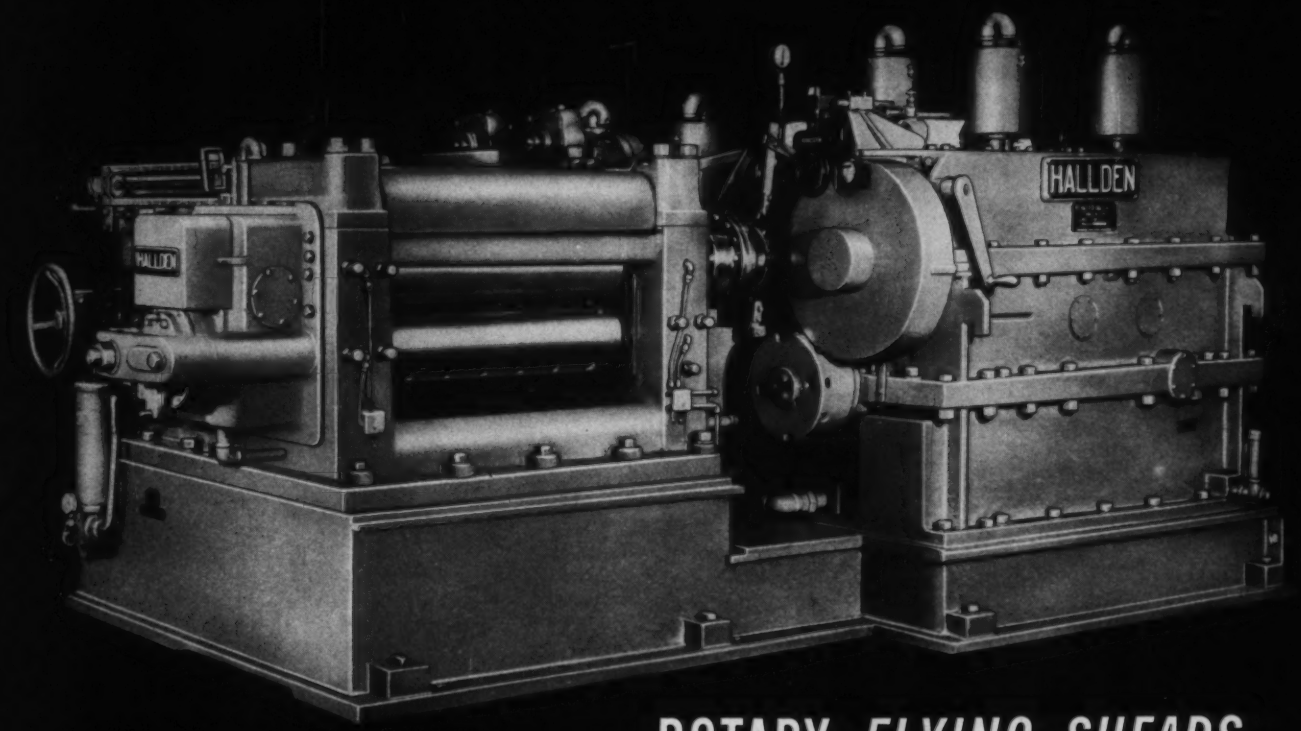
Molybdenum, resistance heating elements provide radiant heat for annealing at 1550° F. Blowers on the sides of the cooling chamber spray inert atmosphere gas on the strip for rapid cooling so the strip is cool enough to coil as it comes out of the tower at speeds of 20 to 120 ft a minute (up to 6000 lb per hour) in 12 to 27 in. widths. And vertical processing of the material makes for savings on floor space.

• Scale formation is prevented by employing dissociated ammonia.

Use of dissociated ammonia as a protective atmosphere prevents oxidation of material in process and is said to improve corrosion resistance.

The company buys liquid ammonia and converts it into a gas that is 75 per cent hydrogen, 25 parts nitrogen. The gas is said to be explosive. But the company has installed the most modern safety equipment and trained its person-

(*Please turn to Page* 102)



ROTARY *FLYING SHEARS*
with "PUSH BUTTON" CONTROL
for HIGH PRODUCTION.... up to 8 cuts per second
ULTIMATE ACCURACY.....

- **SYNCHRONIZED**
- **MICROMETER ADJUSTMENT for both cut lengths and synchronization**
- **ADJUSTMENTS "ON THE FLY" if desired**
- **TORQUE CORRECTIVE GEARING**
- **DYNAMICALLY BALANCED**

HALLDEN

The world's leading machinery manufacturers rely on Hallden shears in their process lines

THE HALLDEN MACHINE COMPANY • THOMASTON, CONNECTICUT

Associates: The W. H. A. Robertson & Co., Ltd., Bedford, England

WHY BE SATISFIED WITH THIS HEAT LOSS . . .

HARBISON-WALKER REFRACTORIES CO.

AND SUBSIDIARIES GENERAL OFFICES PITTSBURGH 22, PA.

World's Most Complete Refractories Service

FOUR REASONS WHY HW 23LI INSULATING FIREBRICK REDUCE HEAT LOSSES AND OVERALL COSTS

WHEN HW 23LI CAN REDUCE THE LOSS 59.3%

1 LIGHT WEIGHT—1.82 LB/9" EQUIV.

This light weight or low bulk density and minute pore size assure low heat storage and high insulating value. The results are substantial savings in furnace weight, construction and fuel.

2 REHEAT SHRINKAGE—0.0% AT 2250°F.

This stability insures longer furnace life, reduces maintenance requirements and lowers overall costs.

3 LOWER THERMAL CONDUCTIVITY—K value at 2000°F.—1.47

The furnace sections above show how HW 23LI—used to back up firebrick furnace walls—have reduced heat losses 59.3%. The savings are substantial in fuel, space, time and weight.

4 ALL THIS—AT NO SACRIFICE OF OTHER IMPORTANT PROPERTIES

The beneficial properties of HW 23LI have been developed without sacrifice of crushing and transverse strength or other desirable physical or chemical characteristics.

HW 23 *Low Iron* Insulating Firebrick were developed especially for controlled atmosphere furnaces. The *low iron* oxide content provides much greater resistance to furnace gas atmospheres than ordinary insulating firebrick. They are also used wherever 2300°F. insulating firebrick are required. Write for complete product and application details.

HW 61-19

(*Concluded from Page* 98)
nel to handle the gas with extreme care.

Ammonia gas obtainable for annealing is usually 99.95 per cent pure.

At Sharon, the gas is upgraded to 99.999 per cent purity and a dew point of $-100°$ F.

The furnace atmosphere is at a slightly higher pressure than the outside air. That permits a small amount of the gas to leave the unit but prevents contamination of the inert atmosphere.

Any small amount of oxygen that enters the furnace combines immediately with hydrogen in the furnace atmosphere. Resulting water vapor is quickly dissipated.

• Edge guides placed at strategic points on the moving strand keep strip on a straight path from the payoff reel to the recoiler.

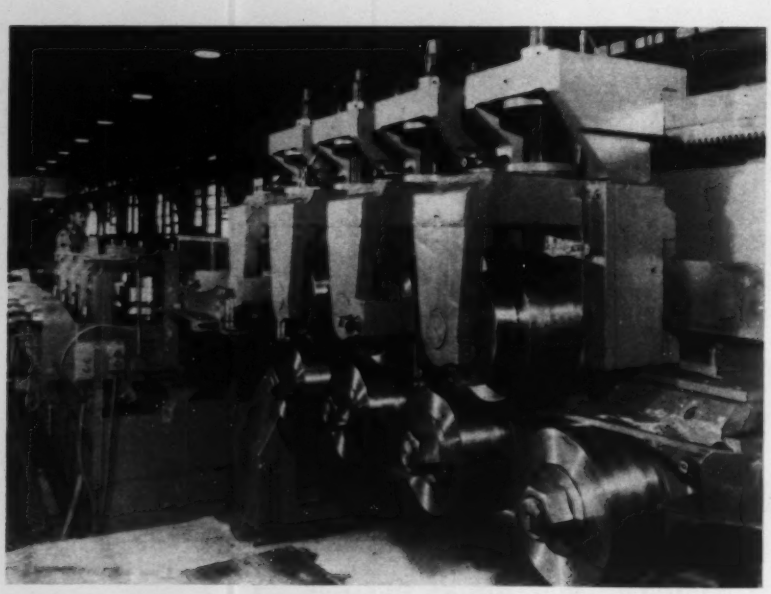
The edge guides, which were supplied by North American Mfg. Co., Cleveland, include transducers that constantly scan the moving strip edge and initiate mechanical adjustment of system rolls. One of the guides is positioned before and after each vertical accumulator. A fifth unit is mounted at the recoiler. It causes the takeup reel carriage to move laterally and insures level rewinding of the strip.

An electric eye determines the lateral position of strip on the upper roll in the furnace. It causes the upper roll to tilt, bringing the moving strand back to center. A readout on the instrument panel allows the furnace operator to check position of strip on the upper roll.

• System failures are minimized by an alarm system installed by electrical department personnel.

Warning lights, identified with annealing line malfunctions, are mounted on an extension of the standard instrument panel. Lights are provided to identify such system failures as loss of air pressure, furnace oxygen above 0.5 per cent, or low furnace pressure.

A loud, electric horn signals the operator when one of the warning lights is flashed on.



Straightener Roll Spans Can Be Varied

MORE ACCURATE straightening of cold drawn shapes is said to be possible with a straightening machine in use at Wisconsin Steel Div., South Chicago, Ill., of International Harvester Co. Reason: Variable bending span on straightener rolls. The machine, built by the Union Medart Div., Pittsburgh, of Blaw-Knox Co., processes bars at speeds up to 300 ft a minute. Sizes: Squares up to 3 in., flats up to 1 by 6 in., and hexagons up to 3 in.

Stock List System Uses Television

• TELEVISION aids steel sales at LeVita Industries and Magnetic Steel & Alloy Corp., Detroit warehousing firms that share the same facilities.

Two units are basic to the system—a closed circuit television camera with desk monitors and a large inventory board with magnetic holders that carry information on items in stock.

• There is only one master list of stocks, so it can easily be kept up to date.

The concave, magnetic board covers one wall of a ground floor room. Made of steel, it is 12 by 20 ft and is nonreflective (a flat paint was used).

Title holders with magnetic bases make up the columns for the board. They carry coded slips of paper with the warehouse information in heavy black figures. With each addition, a new slip is made up, inserted in a holder, and placed on the steel board; deletions are equally simple.

The board has room for more than 3000 items, states Julius Anscher, president of LeVita and vice president of Magnetic Steel.

The board replaces index card files, which were kept by each salesman. Now, instead of correcting each file, only one operation is needed to update the record for the entire sales force.

• A television camera makes the master list available to the telephone salesmen who make customer quotations.

A single television camera surveys the board. It is controlled from desk consoles. The salesmen can turn it to any part of the board and adjust for focus and light level. Control of the "zoom" lens permits the salesman to enlarge the area he wants to examine. After some experience, the salesmen found that they could adjust the camera while holding a telephone conversation, eliminating delays in the sales presentation.

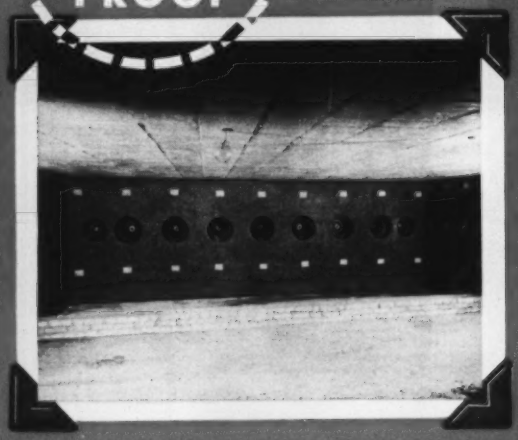
The monitors used are similar to TV viewers. Four are in use, and a second camera is being purchased.

HERE'S UNRETOUCHED PROOF

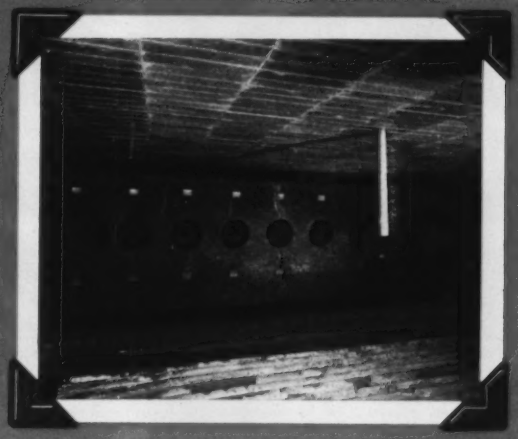
. . . in rail and billet reheating furnace at

INLAND STEEL

Plibrico plastic refractory lining shows how it can take punishment



APRIL 1960 . . . view shows front burner wall of rugged, shock-resistant Plibrico Super "F".



TODAY . . . unretouched photograph of same area shows how Plibrico Super "F" withstands punishment in this high heat zone.

APRIL 1960 . . . view at charging end shows sidewall and flared doors also formed with Super "F", a grade for high heat conditions.

TODAY . . . unretouched photograph illustrates Plibrico's tight, stable monolithic lining of Super "F" after almost one year in service.

PLIBRICO OFFERS A WIDE SELECTION of plastics, castables, gunning and ramming mixes formulated to give you exactly the properties and characteristics you need. Get complete data on Plibrico products and their advantages from your local Plibrico man.

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PLIBRICO COMPANY

1806 North Kingsbury Street, Chicago 14, Illinois

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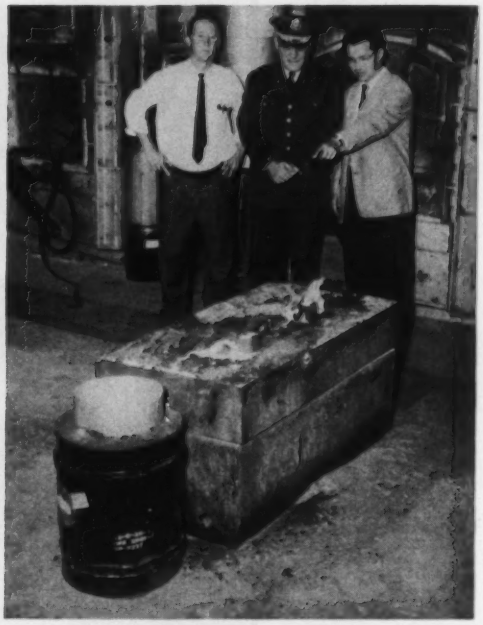
Sales and Service Throughout the World

Since 1914—Pioneers in Refractory Specialties

1235

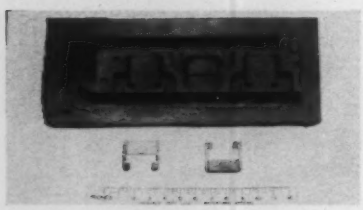
CATALOGS 68 & 71 cover plastics, ramming mixes and castables giving advantages and applications.

Molds prepared on a standard mold machine are heated to 1650° F in a vacuum to decompose resin and form a carbon zircon bond



Bryant W. Crocker, the inventor (left), and arsenal officials compare flame and smoke in conventional, large mold with appearance of carbon bonded mold

New Technique Eliminates Mold Reaction



Here are some typical results: Nut casting of FS 1020, a latch casting of FS 8620. Technique is useful to casters of high temperature alloys, or those that react readily with mold materials, says Mr. Crocker, the inventor

• **EXPERTS look for big things from a new casting technique that employs pure carbon to bond fine zircon refractories.**

Principal features claimed for the method:

• Surface finishes are comparable to the best produced by the shell mold or Shaw processes. (They depend on how fine a refractory you choose.)

• Cores are gasfree and, unlike many ceramic cores, they are easily friable during shakeout.

• The process can be used by most foundries. (It was originally designed for vacuum pouring.)

• Costs are said to be less than those of standard shell molding.

The process was invented by a metallurgist, Bryant W. Crocker, Watertown Arsenal, Watertown, Mass.

It will become available for a nominal fee as soon as the patent is issued. (The government facility is not looking for a profit; it merely wants to use the invention without cost.)

• **The molding process has three steps:**

1. A shell of solid mold halves is formed with conventional equipment.

2. The halves are heated to 1650° F in a high vacuum furnace.

3. Mold halves are hot bonded, or bolted together and poured.

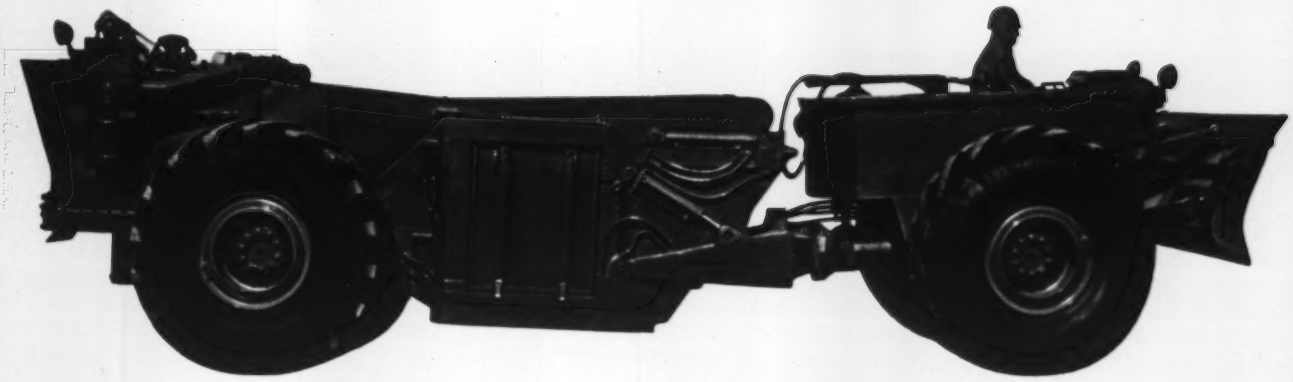
Principal differences from a conventional shell mold: There are no hot gases formed when mold surfaces are hit by hot metal. Also, molds are far less reactive when they are in contact with hot metals.

Titanium, uranium, steel, aluminum, and bronze have been molded with excellent results, states Mr. Crocker. Mix formulas are still being improved.

Those who wish additional technical information may obtain patent data from the Commanding Officer, Watertown Arsenal, Watertown 72, Mass. Attn: ARDBE-OY.

This mark tells you a product is made of modern, dependable Steel.

it digs
it flies
it swims



Army Universal Engineer Tractor built by Hendrickson Manufacturing Company, Lyons, Illinois. Strength with light weight obtained with use of USS "T-1" Constructional Alloy Steel and USS MAN-TEN High Strength Steel.

and does a dozen other things!

The Universal Engineer Tractor, rubber tired (UET-RT), can do the work of a dozen different machines merely by substituting interchangeable sections. Basically, it is a 250 HP steel tractor-scraper dozer that can be flown in a C-130 Aircraft and parachuted into a combat area, ready to operate. In addition, being sectionalized, it can be quickly disassembled for transport by other types of aircraft.

Although it is lightweight for airborne use, the tractor can transport 10 cubic yards of earth at 35 MPH. It was designed by Barnes & Reinecke, Inc., Chicago engineers, to the requirements of the United States Army Engineer Research and Development Laboratories at Fort Belvoir, Virginia. Three and a half tons of weight were saved by designing the yoke, dozer arms, front and rear axle housings, and basic bowl structure with USS "T-1" Constructional Alloy Steel. "T-1" Steel's minimum yield strength of 100,000 psi permitted working stresses of 60,000 psi.

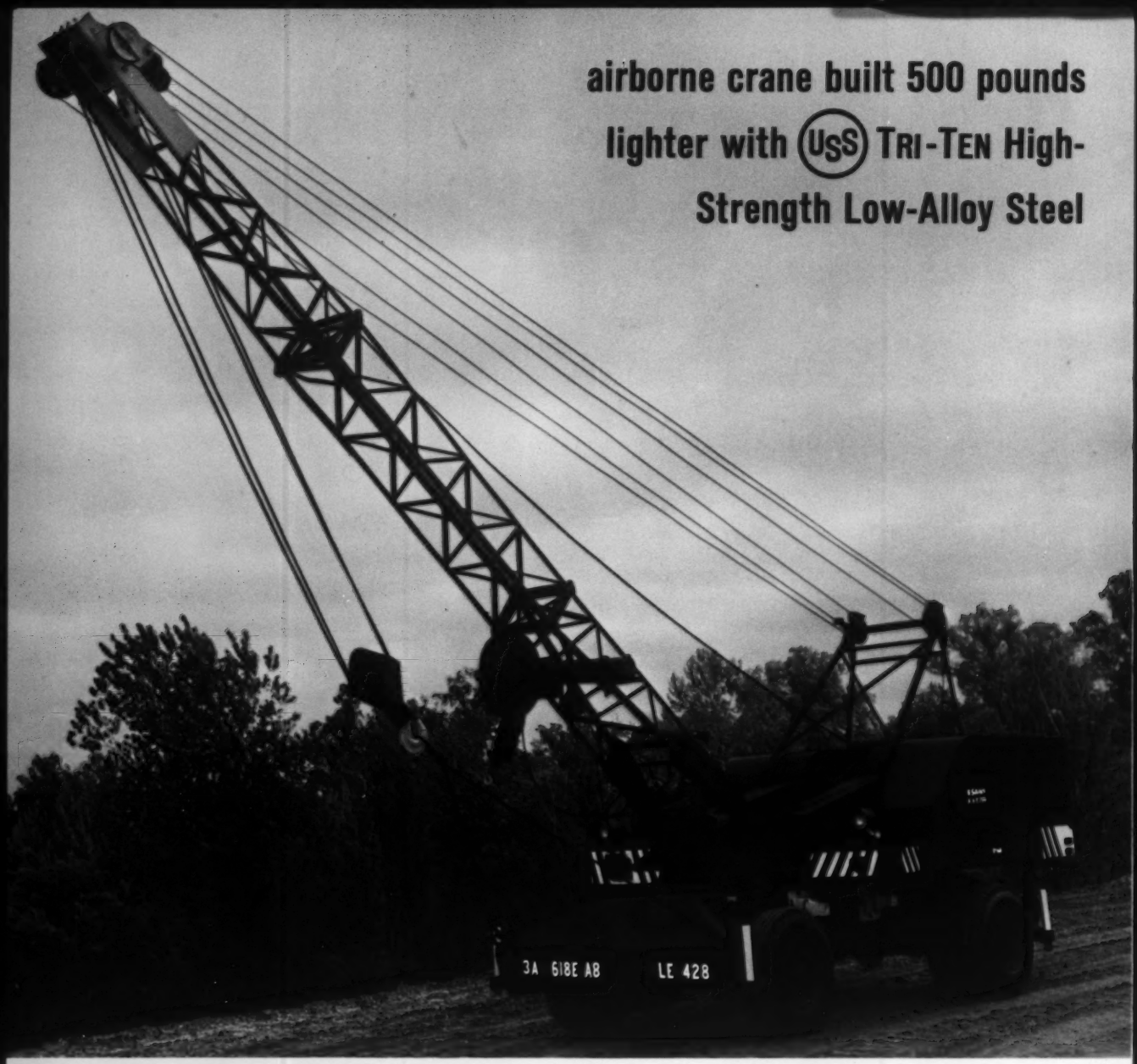
USS MAN-TEN High Strength Steel with 50,000 psi minimum yield point, in the bowl, side plates and dozer blade saved more weight. The complete unit was built tough and strong with 7,500 pounds of USS "T-1" and MAN-TEN Steels.

For other military vehicles, United States Steel makes extremely tough, rolled armor plate, in addition to a complete line of weldable, formable, high strength and alloy steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, "T-1" and MAN-TEN are registered trademarks.

United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division Tennessee Coal and Iron Division · United States Steel Supply Division · United States Steel Export Company

USS United States Steel

airborne crane built 500 pounds lighter with USS TRI-TEN High-Strength Low-Alloy Steel



Lightweight crane built strong with USS TRI-TEN High-Strength Low-Alloy Steel. Designed for the U.S. Army Corps of Engineers, Ft. Belvoir, Virginia. Builder: Koehring Co., Milwaukee, Wisconsin.

This air transportable, air droppable U.S. Army crane had to be strong enough to lift 7 tons but light enough to be parachuted into a combat area. The Koehring Company of Milwaukee, Wisconsin, solved the problem with USS TRI-TEN High-Strength Low-Alloy Steel.

By using USS TRI-TEN Steel in the turntable, the lower works of the cruiser, and the boom, Koehring designers used only two tons of steel . . . with a clear saving of 500 pounds. Strength was not sacrificed because USS TRI-TEN Steel has a minimum yield point of 50,000 psi.

USS TRI-TEN Steel is well known as one of the most weldable and toughest high-strength low-alloy steels in the industry. Its superior notch toughness at low temperature makes it ideal for all-weather mobile equipment. TRI-TEN Steel has excellent weldability, good resistance to abrasion, and high atmospheric-corrosion resistance.

For other military vehicles, United States Steel makes extremely tough, rolled alloy armor plate, in addition to a complete line of high strength steels, "T-1" Constructional Alloy Steel, Stainless Steels and carbon steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, "T-1" and TRI-TEN are registered trademarks

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal & Iron Division • United States Steel Supply Division • United States Steel Export Company

This mark tells you a product is made of modern, dependable Steel.

USS United States Steel

AEC Aids Fight on Instrument Dust

LIKE HOUSEWIVES, instrument makers are constantly fighting lint and dust. Unlike the housewives, instrument makers must wage their battle down to single particles—and that job has become both tedious and costly.

Completing a nine month study sponsored by the Atomic Energy Commission, engineers at Sandia Corp., Albuquerque, N. Mex., have recommended that precision instrument makers find better ways to control dust in their laboratories and on their assembly lines. The study says new standards are being forced by today's requirements for Space Age components with flawless performance.

Sandia's engineers tackled what they term the "cleanroom problem." One of their suggestions for cleaner parts: Don't let people mill around in the room and stir up dust.

But the suggestions go far beyond that. For example, protective clothing is needed to avoid lint in the air; door openings and closings must be controlled; cleaning service must be continuous rather than spasmodic; and dust traps must be minimized or eliminated.

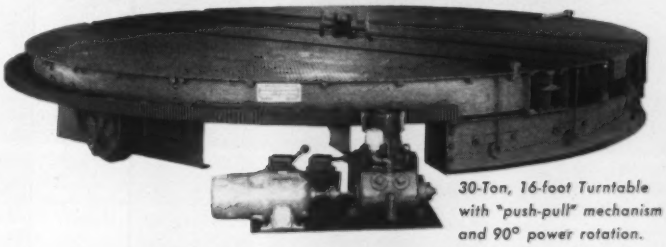
"The use of an air shower at the entrance of a whiteroom is a necessity," says the study. Actually, two air showers are needed, one to blow off lint, fibers, and loose debris from the operator's personal clothing, the other for use after the operator has donned his protective suit and is ready to enter the whiteroom. The problem then is to monitor the airborne contamination.

One of the ways to do that, says the report, is to draw an air sample through "an intensely illuminated sensing zone." The light scattering from a particle of dust or lint in this zone is measured by a photosensing device and converted to pulses corresponding in height to the particle size. The system, says the report, is both rapid and automatic.

The report on the project is being made available through the Office of Technical Services, Department of Commerce. It's called, "Dust Monitoring in Clean Rooms."

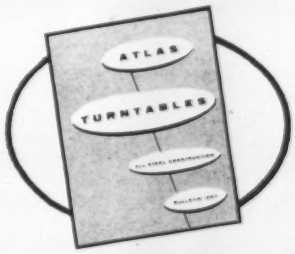
for turnaround convenience

ATLAS turntables



30-Ton, 16-foot Turntable with "push-pull" mechanism and 90° power rotation.

Atlas turntables are made to customer specifications in any size and capacity; for manual or power rotation. Either flush or raised rail arrangement can be provided, with rail size and gauge to match existing track.

Request 

Bulletin 1297

Since 1896... Engineers-Builders of Ore Transfers... Scale Cars... Coke Quenchers... Coal Larries... Door Machines ... Safety-Type Transfers... Storage Battery Locomotives

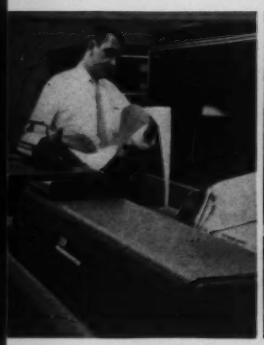
ATLAS CAR & MFG. COMPANY

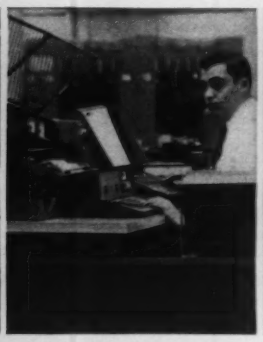
1140 IVANHOE ROAD

CLEVELAND 10, OHIO

Inventory Management Simulator program at...

Clark Equipment... improves customer





■ **High-capacity memory.** Two IBM 305 Data Processing Systems with RAMAC keep track of 75,000 replacement and repair parts in Clark's Chicago parts warehouse. ■ **The computer has the facts.** As soon as shipments arrive at the warehouse, an operator, using this remote inquiry station near the loading platform, finds out from the computers where various items go. ■ **Customer service first.** Using this remote inquiry station in the sales department, the operator gets information from the computer while the customer is on the phone.

Clark Equipment Company has prepared a computer program called an Inventory Management Simulator. The program allows Clark management to study the possible effects of decisions on future customer service and future warehouse profitability. When management gets the computer's report, it is in a position to make new rules for the operation of its parts warehouse.

Here's what's happened since Clark put the new program into operation:... improved customer service... practically eliminated back-order problem . . . reduced the putaway time for incoming material by more than 50 per cent ... reduced emergency order shipping time by 50 per cent... enabled a physical inventory to be taken without any interruption of service to customers.

service...with less inventory

Availability highest ever. Inventory management is a complex job at Clark. Its Chicago warehouse is one of the busiest and largest in the country. Before the Simulator program was developed, the warehouse carried an inventory of 85,000 individual replacement and repair parts. Use of the program helped transfer the investment in inventory to those parts most frequently called for, giving high availability with less investment.

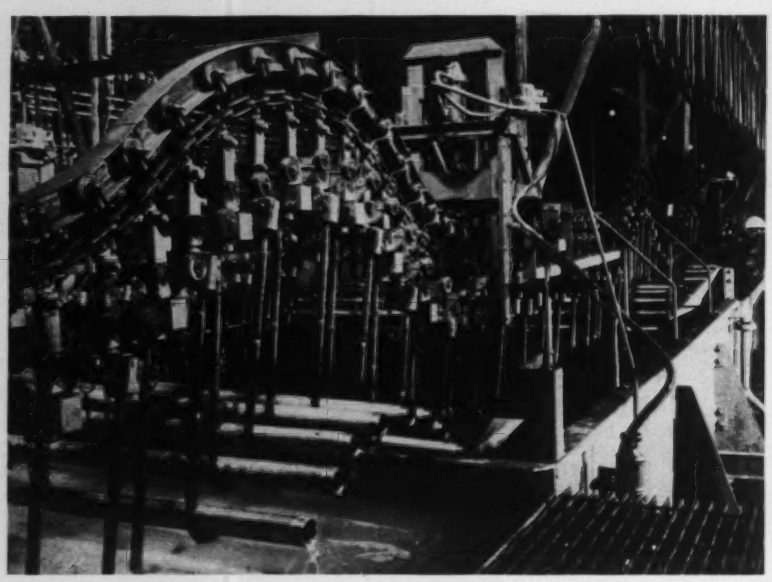
Management Operating System.* Clark installed two IBM 305 Data Processing Systems with RAMAC.® These computers store, update, and offer on an instant's notice information on almost every aspect of the warehouse operation including complete information on every one of the 75,000 items maintained in stock.

Now, Clark is assured of maintaining just the right level of stock for each item. The procurement formulas, developed from the Inventory Management Simulator, even recommend how large a purchase order should be placed for each item and where it should be placed.

If you have an inventory problem, why not consider a simulation program? You don't have to have your own computer. We can supply you with an Inventory Management Simulator...you can rent time on a computer. Result...improve the profitability of your warehouse operation.

**A Management Operating System uses IBM computers to make routine business decisions and take action automatically ...flags problems that need management's special attention... frees management to concentrate on the big problems and on long range planning. As a result, it gives tighter control of all business operations...and helps cut costs.*

IBM®
DATA PROCESSING



Line Electroplates 2000 Pieces an Hour

• THIN WALLED steel conduit is galvanized at speeds up to 2000 pieces per hour at the new Ambridge, Pa., plant of National Supply Div., Armco Steel Corp.

All operations are automatic, from the time the steel tubes are picked up at one end of the line until they emerge, tied in bundles, at the other. The facility will replace the Etna, Pa., plant. (See STEEL, Nov. 28, 1960, p. 101.)

• The conduit finishing department was the first to go into production at Ambridge.

When the combination pipe mill is in full operation (July, 1962), it will be equipped to make steel pipe (continuous weld or electric resistance weld) and stretch reduce seamless pipe to smaller sizes.

In the production of rigid steel conduit, some of the welded pipe will be routed through automatic hot dip galvanizing equipment, cut to conduit length, threaded and coupled, and put through the electroplating line to give threads extra corrosion protection.

• Rinse water is chemically purified before it is discharged into sewer lines. Vents above the equipment carry off any fumes.

The electroplating process includes these 12 steps: 1. Immersion in an alkaline electrocleaner. 2. Rinse. 3. Immersion in a special alkaline cleaner. 4. Rinse. 5. Immersion in the plating solution. 6. Drip dry. 7. Rinse in chlorinated water. 8. Immersion in chromic acid. 9. Chromic acid neutralizing rinse. 10. Cold water rinse. 11. Hot water rinse. 12. Warm air drying.

Following its discharge from the drying oven, the rigid steel conduit goes through the automatic equipment that attaches the couplings and thread protectors. Both the electrical metallic tubing and the rigid steel conduit go through the printing equipment and the automatic bundling equipment.

An electrical current of more than 50,000 amperes is circulated through the plating solution. Zinc anodes in baskets are used to deposit an increased amount of zinc on the threaded ends of the rigid conduit. National Supply uses the chromic acid bath to produce an iridescent chromate finish that helps prevent white rust.

Revamp to Provide Low Cost Hydrogen

THE SPARROWS POINT (Md.) plant of Bethlehem Steel Co. will be able to produce 50,000 cu ft of low cost hydrogen per hour by early 1962. The gas (99.2 per cent pure) will be used in protective atmospheres for annealing coils of low carbon, steel strip.

Five generators originally designed to produce Neutralene-H (a gas that is 15 to 20 per cent hydrogen, the balance nitrogen) are being converted to production of Hydralene, which is almost pure hydrogen. The conversion will make it possible for Bethlehem to mix low cost hydrogen with nitrogen—available as a byproduct from a central station oxygen plant—to produce a variety of annealing atmospheres.

• **Package Conversion Units**—Each conversion unit consists of a multiple tube, steam-natural gas reforming furnace, catalyst converter tower, heat exchangers, and control equipment. Present Neutralene-H producers will be altered slightly and used for further purification of product gas leaving the Hydralene plant.

The package units were manufactured at the Industrial Heating Dept., Shelbyville, Ind., of General Electric Co. GE officials point out that most Neutralene and Neutralene-H units in service can be modified like those at Sparrows Point.

• **Conversion Cost Modest** — The cost of converting units is said to be substantially less than that of all-new hydrogen producing equipment. But it is more economical to purchase complete, continuous atmosphere generators than it is to purchase prepared hydrogen in tanks, cylinders, or similar sources, says General Electric.

The equipment being installed at Sparrows Point is designed to generate 99.2 per cent hydrogen. But available package conversion units or complete Hydralene generators can produce hydrogen that is 97 to 99.7 per cent pure.

• **Many Uses**—Hydrogen is useful

in many metalworking areas, such as in the bright annealing of high temperature alloys, stainless steels, and soft magnetic materials, iron sintering; the sintering of alloy and carbon steels, tungsten ore, high purity tungsten, tungsten carbide, stainless steels, and permanent magnetic materials; brazing of stainless steels and high temperature alloys; and reducing molybdenum and tungsten ores.

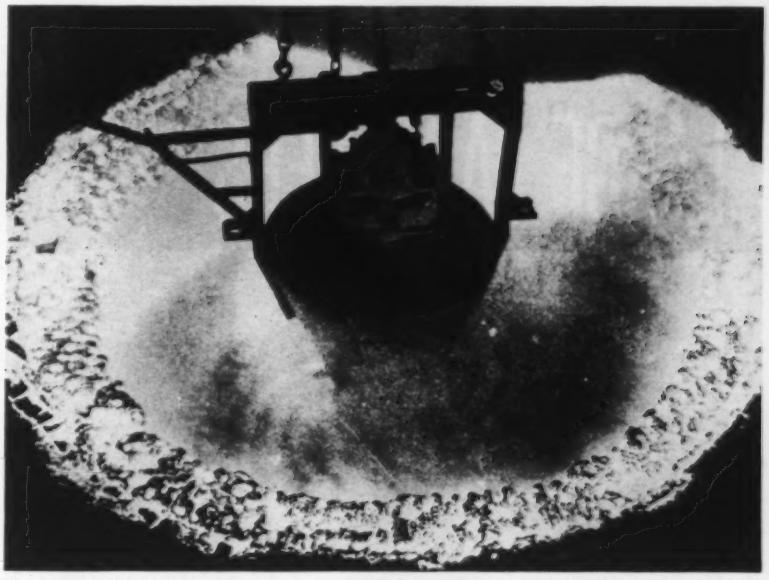
Cermets Stand High Heat in Vacuum

IN THE search for better bearings which will stand high temperatures in a vacuum, scientists at Southwest Research Institute, San Antonio, Tex., have found two oxide bonded cermets that give these results:

- At temperatures up to 1000° F, wear rates are less than one thousandth those of several metal alloys tested (at 14 to 20 fpm, 1500 to 15,000 psi).
- Adhesion, seizure, and surface roughening tendencies of the cermets are less than those of the metal alloys.
- Vacuum seems to have little effect on wear characteristics of the cermets.
- There is some evidence that precious metal films reduce friction, wear, and surface damage, even in a vacuum environment.

• **Composition Is Important**—One of the two cermets has three constituents: chromium, aluminum oxide, and tungsten; the other has four: chromium, aluminum oxide, molybdenum, and titanium dioxide. The scientists believe that the complex structure, unlike that of the metal alloys tested, limits contact between like materials and may account for the improved wear noted in the tests.

The precious metal lubricants (80 per cent silver, 20 per cent palladium) withstood exposure to high temperatures for 2 hours. Frictional coefficients of only 0.2 were obtained with somewhat reduced wear. Smooth, often mirrorlike surfaces were obtained. Gold films didn't lower friction but they did reduce wear.



Cone shaped hopper of the fettling machine is lowered into the electric furnace shell after the heat is tapped. Rotor at the bottom of the hopper throws refractory material into eroded areas in the furnace bottom and at the slag line

Fettling Machine Reduces Furnace Maintenance Cost

A NEW WAY to fettle furnaces is said to offer electric furnace steelmakers up to 40 per cent savings on refractories and a 90 per cent reduction in furnace downtime.

The method, which was developed by Blaw-Knox Co., Pittsburgh, features a centrifugal thrower that can be used with or without a pneumatic conveyor system which was developed earlier by Blaw-Knox for handling dolomite, ore, and other steelmaking materials.

• **Proved in Service**—The unit has logged 56 heats in one installation; it has been in and out of a 75 ton, 16 ft furnace so fast during the fettling process that paint hasn't been scorched. Downtime between heats has been cut from 20 minutes to about 2.

Refractory material required per heat has been reduced to 2400 lb vs. 3000 lb by the previously used fettling method. Use of material containing more fines might save up to 40 per cent, says the firm.

The machine, which has a 5000 lb capacity, is 5 ft high with a diameter of 42 in. at the top and 24 in. at the bottom. But size and capacity can be boosted easily for use on larger furnaces.

• **How It Works**—The unit, called Centrithro, includes a cone shaped hopper, which is lowered into the center of the furnace when the roof is swung aside. A variable speed, air motor mounted above the machine is connected to a shaft that spins a rotor at the bottom.

When the machine is lowered into the furnace by a crane, the rotor spins counterclockwise, distributing refractory material on eroded sections in the furnace bottom and at the slag line. Centrifugal force is said to slide the material along the furnace wall and to help fill eroded areas.

Here is Your Guide to

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Size: 1 3/4" thru 12" bolt diameter

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Re-Entry Heat Estimate Boosted

RETURNING SPACE vehicles may get at least two and one half times hotter than previous estimates have indicated, says the Space Sciences Laboratory, Philadelphia, General Electric Co.

The reason: The air partially ionizes when objects pass through it at 18,000 mph, adding greatly to the convective heating effects. Air temperatures are now expected to reach perhaps 30,000° F. Previous theories only considered the convective heating of a dissociated gas—one that has been broken up into molecules and atoms, not partially ionized.

• **Based on Shock Tube**—The General Electric observations were the result of National Aeronautics & Space Administration studies conducted in a new shock tube.

The study points up the fact that, while ionization has little effect on vehicles at orbital speeds, escape velocities (25,000 mph) produce dramatic increases in heating.

Average body temperatures of space vehicles are not expected to increase particularly because the expected effects won't last more than a few seconds. About the only practical effects will be somewhat heavier ablative material on nose sections and higher stresses within the space structure itself.

Foundry Adds Conveyors, Output Lifted 30 Per Cent

MANAGERS at Empire Steel Castings Inc., Reading, Pa., have added about 550 ft of conveyor in the foundry cleaning department, completing a 1400 ft system. The conveyors, are directly credited with boosting the department's production by 30 per cent. They were built by Logan Co., Louisville.

Four transfer cars connect various parts of the system. One car has three lanes, two at 27 in. and one at 16 in. from the floor. Manually operated, horizontally hinged, conveyor sections and a manual turntable also facilitate transfer from one line to another.

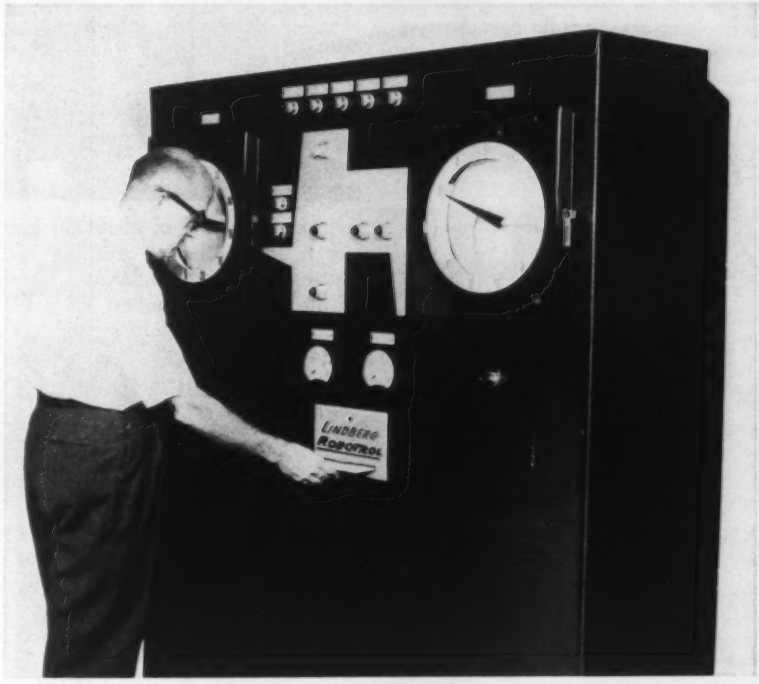
Punch Cards Boost Heat Treating Quality Control

A PUNCH card system, Lindberg's Robotrol, eliminates furnace operator errors. The job ticket is a standard punched card on which the metallurgical department enters detailed specifications. When the work arrives at the furnace area, the operator places the card in a slot on the Robotrol panel. The card controls the furnace operation accurately and provides a record of the exact treatment given to the work.

A control cycle might include: Setting furnace temperature, dew point, time after reaching temperature, dew point for diffusion, quench temperature, and oil quench time or atmosphere cool.

Lindberg says the unit is flexible and can be adapted to any kind of heat treating cycle including existing furnace installations.

For further information, *write* Lindberg Engineering Co., 2450 W. Hubbard St., Chicago 12, Ill.

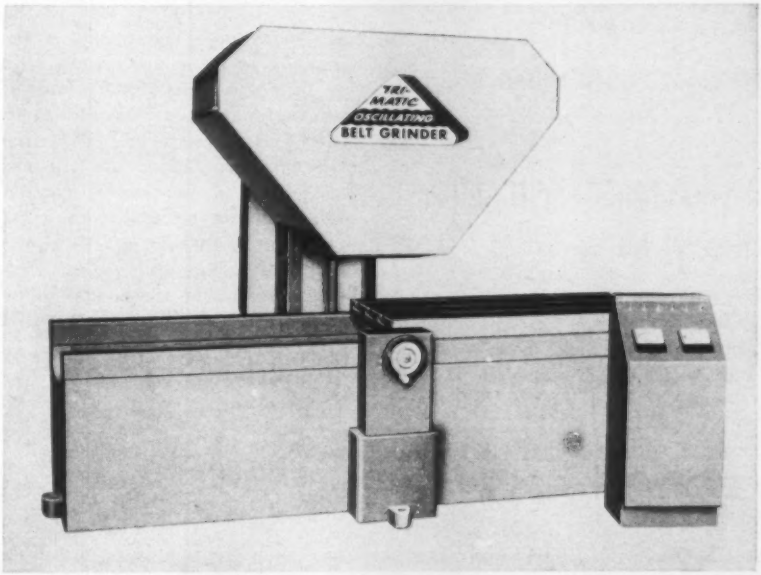


Accuracy Featured on Abrasive Belt Grinder

GRINDING and finishing to high accuracies are advantages cited for the Tri-Matic abrasive belt grinders. They're open side, bed type machines with reciprocating planer type tables. The maker says the units will perform a variety of operations with a minimum of setup time.

The table is powered by a specially designed hydraulic drive that reverses smoothly and eliminates vibration and backlash. Because the belt covers the entire work surface at one time, considerable savings are possible, compared with conventional surface grinding, except where extreme tolerances are required.

The three roll workhead design separates the driving, steering, and contact functions by providing a



roll for each.

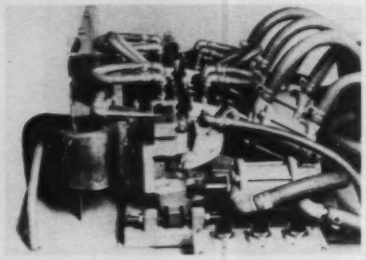
The workhead is mounted on a heavy duty column with long ways and adjustable gibs for maximum rigidity and accuracy. The vertical movement of the workhead is controlled by a calibrated handwheel. The open side permits belt changes to be made in seconds. No belt tracking adjustments are needed.

For further information, *write* Tri-Matic Div., Sales Service Mfg. Co., 2363 University Ave., St. Paul 14, Minn.

Setup Heats, Bends Tubing

RAPID heating and bending of ½ in. OD, heavy wall, forged steel tubing to close tolerances is performed automatically in a unit made by Thomson.

The machine combines the circuitry, controls, and cabinet of a resistance welder with a clamping



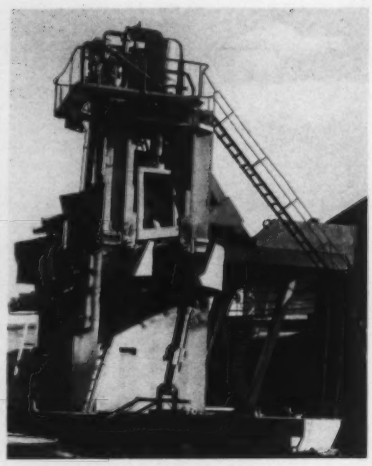
system that holds the work and then applies bending force after the lapse of a brief, intense heating period.

For further information, *write* Thomson Electric Welder Co., 161 Pleasant St., Lynn, Mass.

Hydraulic Shear Handles Heavy, Bulky Scrap

HEAVY, bulky, steel scrap can be easily processed to preselected lengths by a shear developed by Harris. The charging box can take a piece of 1 in. plate, 30 ft long and up to 12 ft wide, and compress it to 36 in. width before passing it under the guillotine cutter head.

First of the units will operate at Turner, Kans., processing railroad scrap. The shear operates at



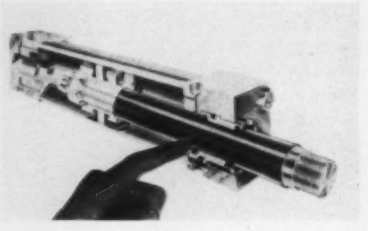
a production rate of about 30 tons per hour and has a crushing and cutting force up to 1200 tons. Size of the charging chamber: 360 x 145 x 60 in. in open position, 360 x 48 x 34 in. closed. The shear throat is 36 x 36 in. Shear force is 933 tons normal, 1159 tons maximum. The unit can make four to six cuts per minute.

For further information, *write* Harris Foundry & Machine Co., Cordele, Ga.

Long Service Life Claimed For Bronze Coated Rods

A ROD material called Bronze Case is said to provide substantial reductions in the cost of bushing and rod replacements and losses from downtime. The cost of lubrication is reduced as well as the size and weight of many mechanisms. In one application, life was increased more than tenfold, says the maker.

Since the porous bronze surface maintains lubrication over the entire length of the stroke, friction losses can be reduced. In some applications, that permits the use of smaller motors and drives. Also better lubrication frequently solves problems of stick slip or chatter, says

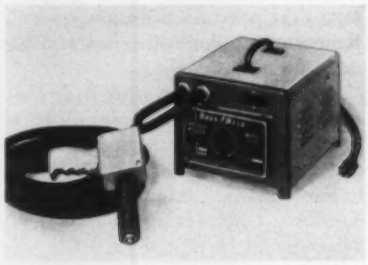


the company. In reciprocating applications, the effective bearing length is increased by the stroke length (wear is spread over a large area).

For further information, *write* Thomson Industries Inc., 1029 Plandome Rd., Manhasset, N. Y.

Low Cost Stressed by Studwelder Manufacturer

LOW COST is stressed by the maker of the Model P-10 Mini-Stud welder. Designed without pushbuttons or triggers, the gun is automatic with self-initiating circuits. The operator need only press the stud against the work; the weld is automatically timed and the gun shuts off when the weld is completed. No previous experience is required.



The unit is designed for welding a wide range of pins, studs, and small screws to sheet metal and can be used successfully in many applications, including building construction.

For further information, *write* Bren/Weld Corp., 5114 Third Ave., Brooklyn 20, N. Y.

Unit Reams, Drills Structural Assemblies

A MACHINE that reams and drills holes up to 1 5/16 in. in structural steel assemblies utilizes a gimbal mounted, counterweighted boom that can be raised and lowered on vertical rails attached to a swiveled roller carriage. The unit is both versatile and portable.

The reamer drive spindle is mounted in the end of the boom in a swivel unit. Motion is controlled through a roller chain drive to a fixed sprocket at the boom pivot

STEELMAKING AT JESSOP

Survival? It could depend on a 3,000-mile picket fence

Ever-vigilant sentinels against surprise attack are the radar installations along the DEW Line. Stretching 3,000 miles across Canada and Alaska, this electronic fence is our first line of defense.

At bleak, lonely outposts Air Force and civilian technicians watch for tell-tale blips on radarscopes—Distant Early Warning of the possible approach of enemy aircraft or missiles.

This all-weather system must withstand the worst of the elements—sub-zero temperatures, high velocity winds, rain, snow and ice storms common to the Far North. And dependability of the equipment could determine whether or not we survive an attack.

There are numerous applications for specialty steels made by Jessop Steel Company in DEW Line installations. For example, forging quality alloys and wear-resistant tool steels for the gear mechanism of a rotating surveillance radar; cast-to-shape steel for certain other component parts and precision ground steels for delicate instrumentation.

Jessop is keenly aware of the importance of built-in dependability in the steelmaking process—whether meeting specifications for steel to be used in the nuclear reactor of a Polaris-firing submarine; a Redstone missile to launch an astronaut; an earth-girdling satellite; or a DEW Line radar installation.

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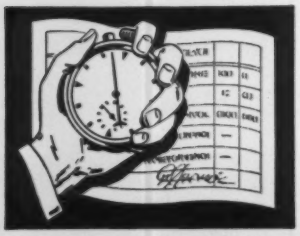


The addition of a big Steelweld Pivoted-Blade Shear in the Follansbee Metals Warehouse at Pittsburgh has greatly speeded the plate service they provide.

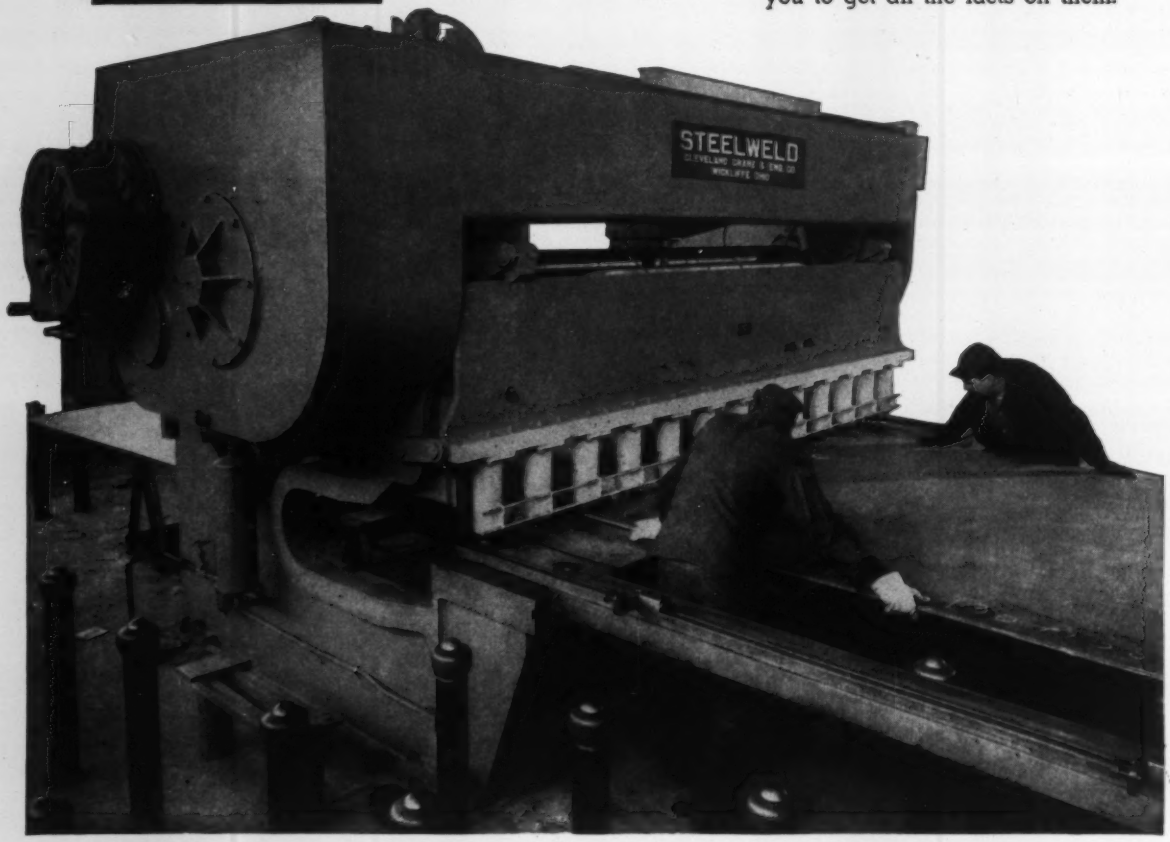
Hot rolled steel plates, stainless plates, floor plates and other metals are cut smoothly and accurately. The machine can handle mild steel up to 12'-0" x ¾". The 36" deep throat permits slitting plates 72" wide down the middle for any length.

Because of the Micro-Set knife adjustment, it is quick and easy to properly set the knife clearance to obtain the best possible cut for every thickness. No other shear has this outstanding feature.

It was only after a thorough study of all makes of shears that Follansbee decided upon Steelweld. And it has fully proven up to expectations.

It makes the cuts as desired in metals of various characteristics. It is fast and easy to operate. All parts are readily accessible and the many adjustments provided minimize and simplify maintenance.

Steelweld Shears are the very latest and most modern on the market today with a host of points of superiority. We urge you to get all the facts on them.



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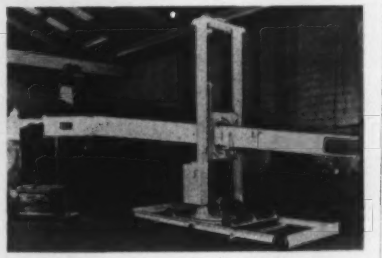


point. The reamer spindle remains in a vertical position as the reamer is fed through the work.

The roller carriage provides free back and forth movement to allow for the arc motion of the boom end during reaming. It also provides sufficient travel motion to cover the area of a complete bridge joint.

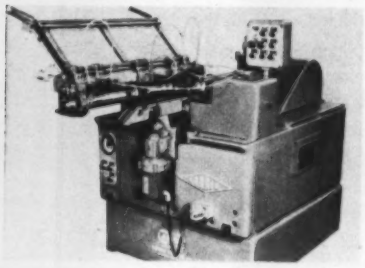
For further information, *write* Walter P. Hill Inc., 22183 Telegraph Rd., Detroit 19, Mich.

Modification Permits Automatic Thread Rolling

A FEEDING magazine and automatic tooling permit the Lan-Nu-Rol thread rolling and forming machine to continuously roll studs and headed parts. The compact arrangement was designed to automatically thread roll parts up to $\frac{3}{8}$ in. in diameter having a maximum thread length and over-all workpiece length of $2\frac{1}{8}$ and 32 in.

The machine shown is set up to roll form automotive parts at a rate of 170 parts per minute. Segmental thread rolling dies can be substituted for the roll forming dies.

Rods are manually loaded into the magazine (adjustable for lengths up to 32 in.). From the magazine, rods are automatically



(*Please turn to Page* 120)

For the first time tin coated thin strip is available in solderable coatings up to .0025" thick.

Pure tin and tin-lead alloys are now coated on copper, brass, or nickel in all gauges from .002 to .012 in thicknesses of .00002 to .0025.

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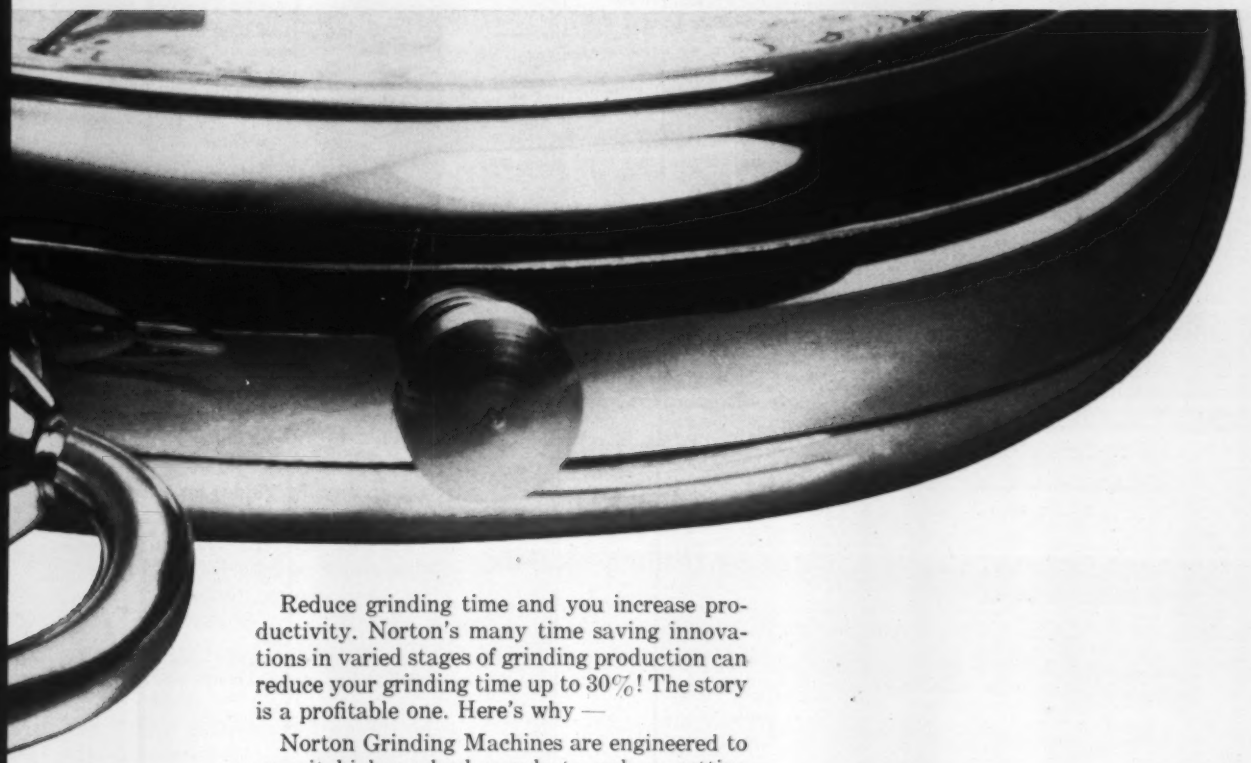
Time is the measure of productivity



Reduce grinding time and you increase productivity. Norton's many time saving innovations in varied stages of grinding production can reduce your grinding time up to 30%! The story is a profitable one. Here's why —

Norton Grinding Machines are engineered to permit higher wheel speeds to reduce cutting time. Norton's *Automatic Wheel Balancer* balances the wheel in *five seconds — on the machine.* You reduce time spent "grinding air" up to 85% because of Norton's *Automatic Wheel Contact Accelerator* which speeds the wheel to the work and compensates for work piece-diameter variation. Another advance is Norton's *Automatic Truing* which eliminates work interruptions and the *Automatic Wheel Wear Compensator* that stabilizes the grinding cycle.

Norton Grinders further add to your productivity by minimizing work spoilage with *Automatic In-Process Gaging.* In the case of surface grinders Norton *Higher Table Speed of 150 fpm* actually reduces grinding time up to 50%.

These are only some of the many reasons you can increase your productivity with Norton Grinders. They also offer accessories that literally transfer skills to machines — *ultra-fine feed,* and *automatic features* such as *steady resting, endwise locating, loading, constant peripheral wheel speed* and *hydraulically-operated feed screws* provide this competitive advantage.

The decision is yours — can you afford not to reduce the time it takes to produce your product? Can you afford not to increase your productivity? Contact your Norton man, NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 18.

NORTON

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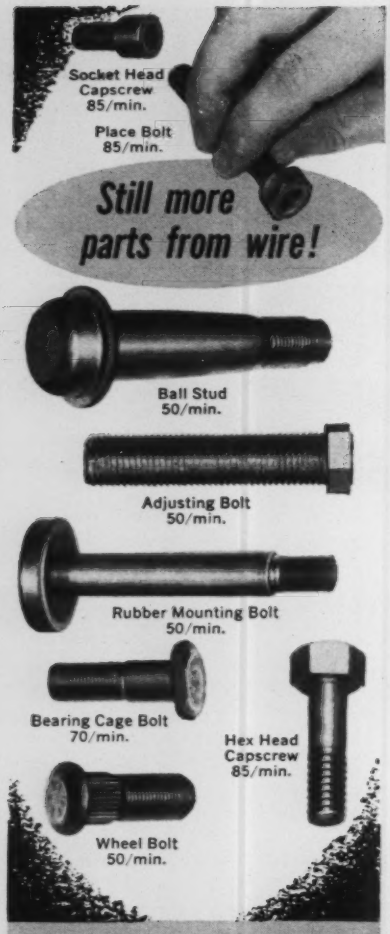

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Operations include cutting off, extruding, heading, trimming, pointing and thread-rolling.

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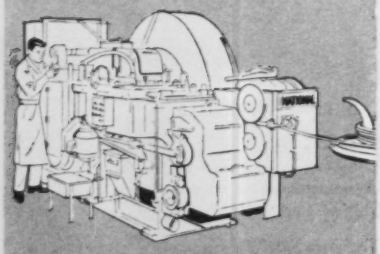

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4,200 PARTS PER HOUR!

NATIONAL MACHINERY CO.

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HARTFORD DETROIT CHICAGO

NEW PRODUCTS and equipment

(*Concluded from Page 117*)

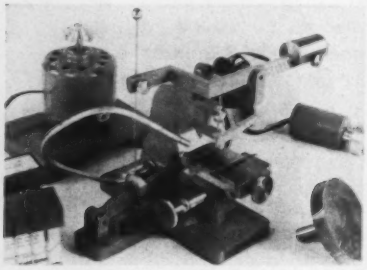
indexed into rolling position where the special segmental type dies roll form the piece.

After rolling, parts are indexed out of the rolling zone and dropped into a continuous conveyor. The machine indexes twice to roll two parts per revolution of the two segment die.

For further information, *write* Landis Machine Co., Waynesboro, Pa.

Tiny, Precision Holes Made by Drilling Machine

HOLES as small as 0.0001 in. in diameter can be precisely drilled by the Najet Model 7A in a wide variety of metals. The unit employs no conventional chuck, spindle,

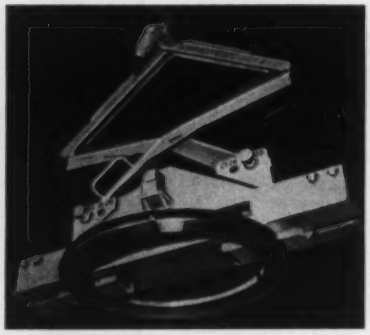


or bearings. The operator is relieved of the drill truing operation and is assured absolute concentricity. The company says the equivalent of absolute zero spindle and bearing tolerance is provided. It says that a micrometer stop, counterbalance, and vibrationproof design help produce top results with inexperienced operators.

For further information, *write* National Jet Co., Cumberland, Md.

Grab Handles Narrow Coils

A GRAB designed for handling a wide range of narrow width coils uses a double rim, gripping design. Large or small OD's can be handled with the same unit (Mansaver style 1767). Different ID's can also be handled. A quickly removable pin is taken out and the outer sliding leg is lifted, then moved in or



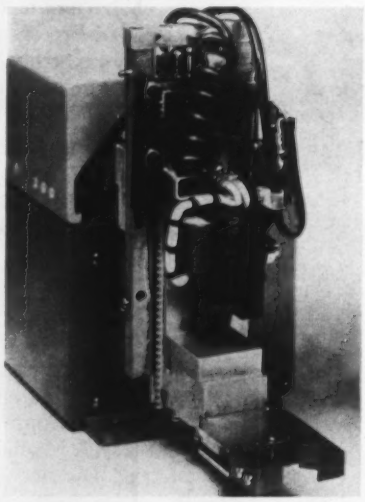
out to the correct rim diameter, and re-engaged by a lever. The pin is then reinserted (without the aid of tools). The inner jaw is reset in a similar manner. The inner jaw is supported by guides for easy sliding.

For further information, *write* Mansaver Industries Inc., 3142 East St., New Haven, Conn.

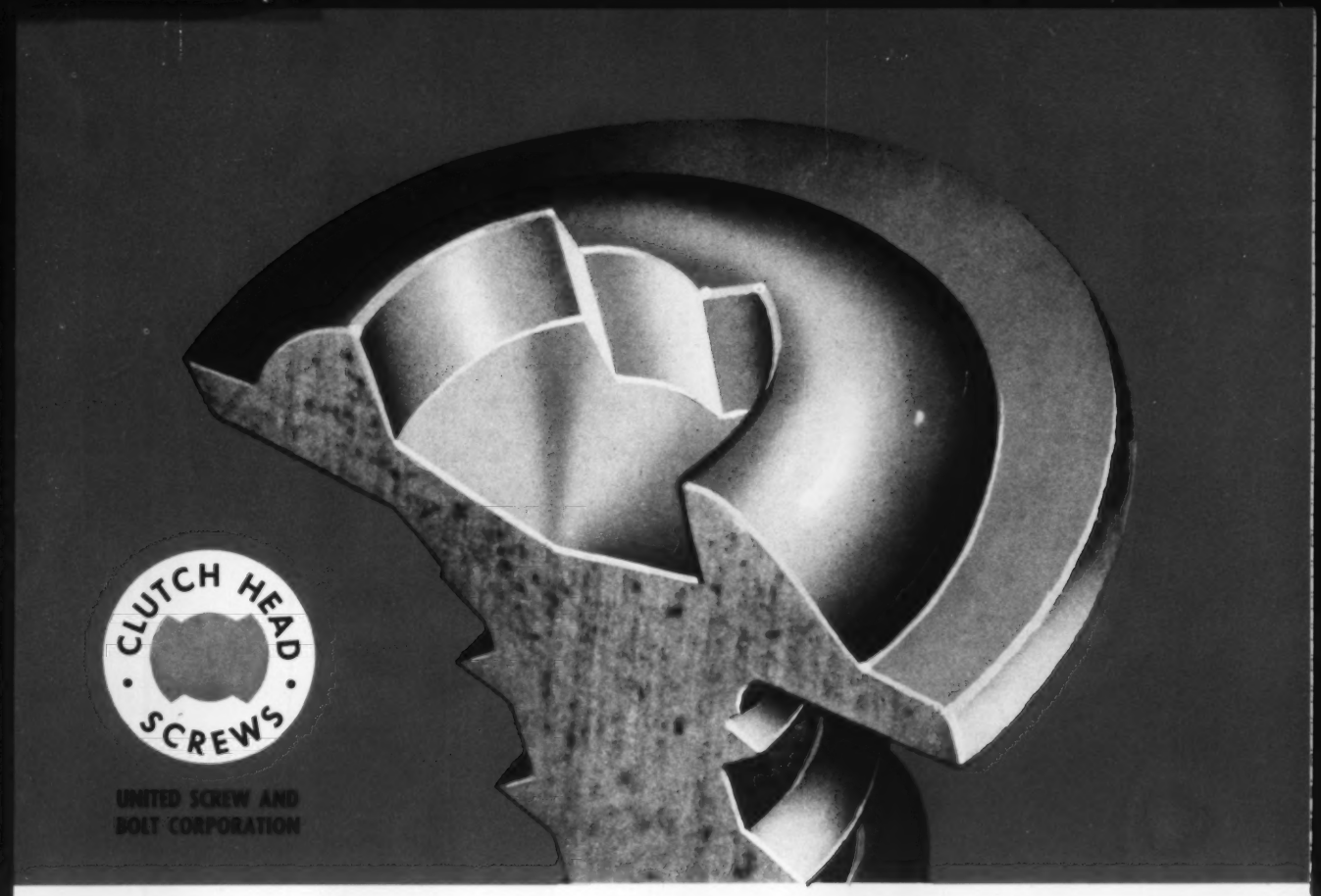
Jaws Fit Existing Units

PRESENT installations of the TransfeRobot 200 and new models can be fitted with an electromechanical head assembly that permits the jaws to be programed to actuate independently of head travel.

The jaws are solenoid operated and can be controlled by signals originating in the control logic, associated machinery, or both. The jaws can be mounted in line with the axis of the TransfeRobot or at right angles. Special jaws are available.



For further information, *write* USI Robodyne Div., U. S. Industries Inc., Silver Spring, Md.



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It will pay you to investigate the flowability of Keystone Wire. This may give you that extra advantage you need to cold head more difficult jobs—get greater production—reduce machine downtime—increase die life—make more profit. We'll help you find out.

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Keystone Steel & Wire Company, Peoria, Illinois

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48 buffing machines ...and no dust!

Buffing brass parts can be a dirty business . . . but it's just the opposite at Grand Rapids Brass in Grand Rapids, Michigan. Here, one AAF Type N ROTO-CLONE snatches up dust the instant it is produced at 48 buffing machines. This one AAF unit is handling 32,000 cfm of air filled with metallic dust and sticky adhesive lint particles.

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In addition to buffing—whether manual or automatic—the Type N ROTO-CLONE has many other industrial applications. Call your local AAF representative, or write direct for Type N ROTO-CLONE Bulletin 277. Address: Robert Moore, American Air Filter Company, Inc., 443 Central Ave., Louisville, Kentucky.

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Steam Trap Maintenance

Proper installation practice and maintenance and inspection rules for mechanical steam traps are listed in a four page folder. Strong, 508 Sandusky St., Conneaut, Ohio.

Foil Annealing Furnaces

The lead article of *Heat Treat Review*, (Vol. 12, No. 3) describes the use of four radiant tube, power convection, foil annealing furnaces in the rolling mill of a large producer of aluminum foil. Surface Combustion Div., Midland-Ross Corp., Toledo 1, Ohio.

Solids Lubricants

Lubrication by Solids as a Design Parameter, an eight page presentation, discusses the important aspects of solid lubrication from the viewpoint of the original equipment designer. Included is information on boundary friction and the theory of solid lubrication. Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

Eye Protection Program

The essentials of an eye safety program are discussed in a brochure designed to help safety personnel. Fendall Co., 2222 Diversey Parkway, Chicago 47, Ill.

High Temperature Ceramics

Detailed information on such ceramic compositions as alumina, magnesia, thoria, and zirconia is presented in a pamphlet. Charts enable quick comparison of melting points, thermal shock resistance, specific gravity, and other properties. Laboratory Equipment Corp., St. Joseph, Mich.

Refractory Production

X-ray Analysis Solves Production Problems at General Refractories, a four page folder, deals with routine production control of chromic oxide and routine development work on iron oxide, silica, magnesia, and alumina. Instruments Div., Philips Electronics & Pharmaceutical Industries Corp., 750 S. Fulton Ave., Mt. Vernon, N. Y.

Flash Evaporator Conversion

A manufacturer of saline water conversion equipment has published an eight page bulletin on flash evaporation. It covers design capacity, scale control, heat sources, and basic operating principles. Aqua-Chem Inc., 225 N. Grand Ave., Waukesha, Wis.

Industrial Gas Data

Physical and chemical properties of oxygen, nitrogen, argon, helium, hydrogen, carbon dioxide, acetylene, neon, krypton, xenon, and the medical gases are presented in a pocket sized, 48 page booklet. Handy conversion tables provide a simple and fast method for changing volumetric information from one equivalent to another. Specify Form ADE-890. Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

Noise Control

The fundamentals of industrial noise control are discussed in a 16 page booklet. Dept. P, Instrument Div., H. H. Scott Inc., 111 Powdermill Rd., Maynard, Mass.

Laminated Plastics, Fibers

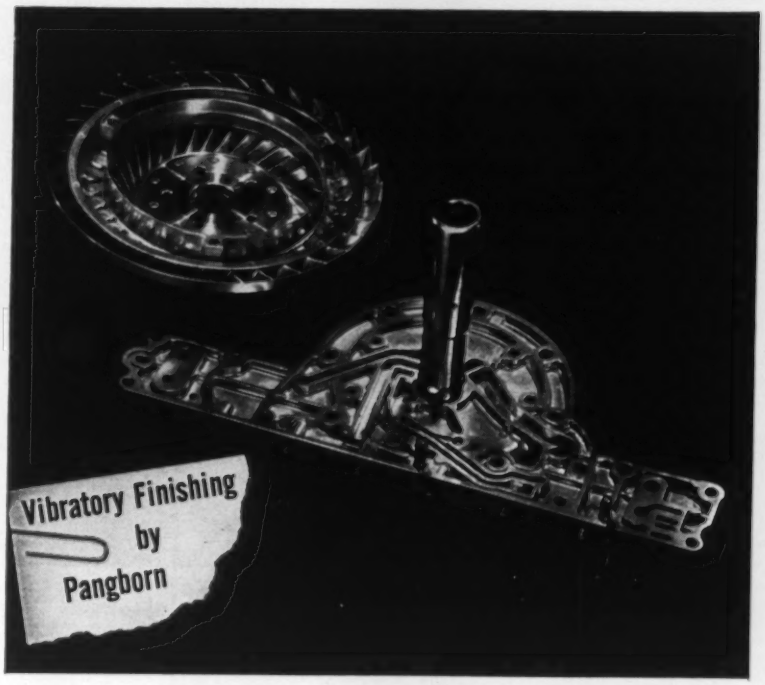
Data in a Taylor brochure can be helpful in selecting laminated plastics and vulcanized fibers for electrical, electronic, and mechanical applications. Taylor Fibre Co., Norristown, Pa.

Stainless Strip Steels

Data on analyses, physical and mechanical properties, heat treating, and finishing of 19 stainless steel types are presented in a 32 page brochure. General cleaning procedures for fabricated stainless products and weight tables are also included. Superior Steel Div., Copperweld Steel Co., Carnegie, Pa.

Rayon Strapping Report

Strength and performance of rayon cord strapping are discussed in a report. Performance areas covered include package reinforcement, unitizing, palletizing, and energy absorbing ability. Industrial Packaging Dept., American Viscose Corp., 1617 Pennsylvania Blvd., Philadelphia 3, Pa.



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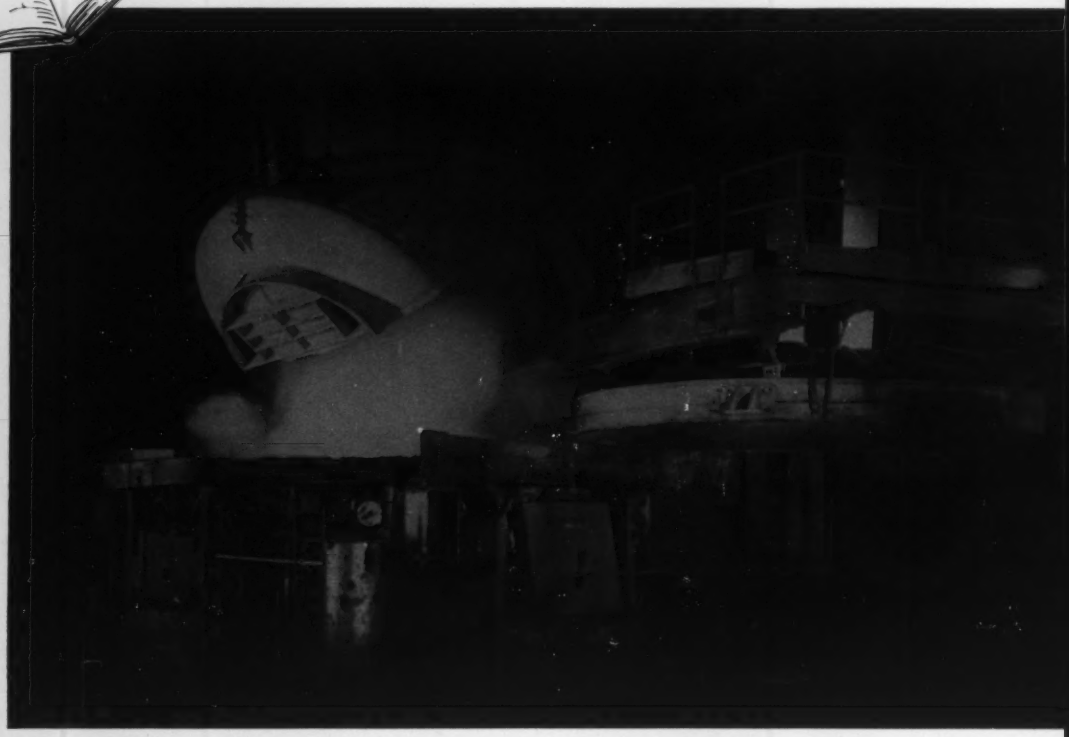

The Acme-Newport name is written big and often where it counts most—in the order books of steel buyers. Before the turn of the century this basic steel producer had become top choice for unusual service and strict adherence to specification. Skilled personnel, modern facilities, alert management and persistent checks by metallurgists, have combined to make Acme-Newport specialists in the products listed below. Flexibility of operation permits fast delivery of spot orders, too . . . if you just mark them *Red Circle Service*.

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- Electric Weld Line Pipe
- Spiral Welded Pipe

Acme-Newport Steel COMPANY

NEWPORT, KENTUCKY

A SUBSIDIARY OF ACME STEEL COMPANY

Upturn Seen for December

LOOK FOR a 5 to 10 per cent gain in steel production and shipments during December.

Operations are sure to pick up in spite of holidays, seasonal cutbacks in consumption, and yearend efforts by some consumers to keep inventories low. Here's why: 1. Demand from automakers, appliance firms, and other consumers is on the upswing. 2. Steelmakers plan to increase stocks of semifinished material in anticipation of a sharp buying upturn early in '62.

UPWARD TREND—Look for ingot production in the week ending Dec. 9 to be slightly higher than the 2,040,000 tons that STEEL estimates the industry poured in the week ended Dec. 2. Output then was 0.4 per cent above the previous week's. November's production was about 8.7 million ingot tons, 5 per cent less than October's. Assuming a 5 to 10 per cent gain in December, this year's production will be between 97.5 million and 98 million ingot tons (vs. 99.3 million tons in 1960).

AUTO SALES ENCOURAGING—Much of the optimism that steelmakers feel stems from confidence that 1962 will be a banner year for the automotive industry, their biggest customer. New car sales in the middle third of November were the highest ever for that period, and sales for the entire month are expected to break the November record of 529,000 that was set in 1955 and equaled in 1960. Says William C. Flaherty, director of business research, Chrysler Corp.: "Domestic car sales are running at an annual rate of 6.5 million." If the trend continues, next year's sales will be 20 per cent higher than this year's.

INVENTORIES TO EXPAND—To protect themselves against the possibility of a strike when the steel industry's labor agreement expires June 30, automakers will start building their inventories after the first of the year. By May 31, they expect to have supplies that will last them three or four months. Appliance manufacturers are also planning buildups, but on a less ambitious scale. One reportedly plans to add a six weeks' supply of cold rolled sheets figuring that strong automotive demand will tighten the market. The buildup will be made in five equal steps, starting in January and ending in May. In 1959, the same firm foresaw a long strike and upped its inventory by three months.

BUILDUP MAY BE ORDERLY—Steelmakers have worked out arrangements with auto companies and other big customers that will permit them to reach their inventory objectives. At the same time, they're trying to assure lesser buyers an equitable share by keeping automotive orders within the framework of a reservation system. They're hopeful that the buildup will be more orderly than it was last time. In 1959, some customers waited until February or March to order and then demanded double and triple quantities.

OUTLOOK FOR 1962—"If you feel that there is strong stimulation for the economy to really go places, then you should plan on 1962 steel ingot production of 110 million to 115 million tons," says Walter L. Moore, director of commercial research, Jones & Laughlin Steel Corp. "If you are bearish about the upward movement of the durable segment of our economy in the fourth quarter, then you'll adhere to the 105 million to 110 million ton forecast." He looks for 1962 domestic steel consumption to exceed that of 1955 (the record year for ingot production) in all markets except railroads, ordnance, shipbuilding, and exports.

WHERE TO FIND MARKETS & PRICES

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*Current prices were published in the Nov. 27 issue and will appear in subsequent issues.

Capital "frozen" in steel inventories is a needless expense...you incur additional costs as long as the steel remains in your possession. And, these costs must be added to the purchase price...to get the *true cost* of steel ready for use.

Review the check-list—use it to estimate the expense you save by having Frasse deliver the steel you need...on a job-by-job basis.

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HELPS YOU AVOID THESE COSTS OF POSSESSION

- ☐ cost of Capital tied-up in Inventory
- ☐ cost of Space and Storage
- ☐ cost of Labor Handling
- ☐ cost of Scrap and Wastage
- ☐ cost of Obsolescence
- ☐ cost of Taxes and Insurance
- ☐ cost of Capital invested in Material Handling and Cutting Equipment

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STEEL
QUARTERLY SURVEY

MILL PRODUCTS	CURRENT INVENTORIES					1st Quarter FORECAST		
	UNDER 10 DAYS	10-30 DAYS	30-60 DAYS	60-90 DAYS	3-6 MONTHS	LOWER	SAME	HIGHER
HOT ROLLED CARBON BARS	11%	26%	41%	17%	5%	6%	75%	19%
COLD FINISHED BARS	11%	27%	46%	15%	1%	6%	68%	26%
HOT ROLLED SHEETS, STRIP	10%	16%	45%	23%	6%	6%	66%	26%
COLD ROLLED SHEETS, STRIP	6%	21%	47%	20%	6%	9%	58%	33%
GALVANIZED SHEETS	13%	13%	50%	19%	5%	8%	58%	34%
STAINLESS SHEETS, STRIP	14%	18%	30%	29%	9%	5%	74%	21%
PLATES	11%	17%	42%	19%	11%	9%	68%	23%
STRUCTURAL SHAPES	8%	29%	44%	14%	5%	11%	67%	22%
MANUFACTURERS' WIRE	9%	20%	62%	6%	3%	2%	83%	15%
MECHANICAL TUBING	14%	26%	41%	13%	6%	6%	70%	24%
PRESSURE TUBING	14%	20%	52%	7%	7%	7%	72%	21%

For aluminum and copper, see Page 148.

Figures are percentages of respondents to STEEL's quarterly survey. Underscored figures show how respondents reported. Current inventories are in days' supply, while the forecast is in terms of physical volume.

Push Is On for Higher Inventories

THE STRONGEST BUILDUP of inventories of steel mill products since the poststrike period of 1959-60 is underway, and it will continue unabated for at least the next three months.

While a large majority of the respondents to STEEL's latest survey of metal buyers continue to hold the line on inventories (70 per cent), the level is 5 percentage points below that reported in the previous poll (see STEEL, Aug. 7, p. 98). In addition, there has been a noticeable shift among those planning to reduce stocks (only 7 per cent vs. 13 per cent in midsummer) and a significant improvement in those planning to add stocks (23 per cent today vs. 12 per cent in August).

• **Signposts** — A further reason for expecting an upturn in inventories: Sixteen per cent of the respondents report they are understocked on a wide variety of products. Only 12 per cent say they are overstocked compared with 19 per cent in the previous survey. Finally, delivery problems about doubled between the taking of the two surveys—only 5 per cent had troubles in August compared with 10 per cent now.

Manufacturers may be gaining better control over their stocks. About 74 per cent of the buyers report that their inventory level is where it was in August, despite a considerable increase in production in the meantime. (Only 69 per cent so reported in the survey for August.) Evidently, ample capacity in the steel industry has permitted cost conscious buyers to hold the line.

One manufacturer even went so far as to say: "The Philadelphia area is a buyer's dream—ideal for us. Every type of metal is available from stock." But a buyer from St. Louis sounds a note of caution when he remarks: "We are maintaining a well balanced inventory, but we look for trouble if it is not increased."

• **Significance** — A glance at the table above shows that the most popular inventory position is still the 30 to 60 day range—43 per cent of all respondents so reported. Next in popularity is the 10 to 30 day range, with 24 per cent. But if the

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forecast comes true, you can expect a major shift into the higher categories: The 30 to 60 day level will still be in the No. 1 spot, but the 60 to 90 day category will move into second place.

The strongest upward movement is in the largest tonnage products—sheets, strip, and bars. It means that the steel mills will have to step up operations considerably in the next three months to meet demand, or shortages will develop. It is reported that the auto companies are preparing to boost stocks to the three month level by July 1, which may put the pressure on others to do the same to be assured of the steel needed to meet anticipated gains in production schedules. (The consistent rise in new orders and backlogs for durable goods practically assures higher metalworking operations in the first half of 1962.)

A Connecticut purchasing agent speaks for many of his colleagues: "We expect steel inventories to grow during the first half of 1962 due to impending labor negotiations in the steel industry. I feel we will do the same as we did in 1959."

Price Hike May Be Nearer, Says Armco's President

The time for an increase in steel prices may be nearing, hinted Logan T. Johnson, president, Armco Steel Corp., Middletown, Ohio, at the opening of the Sheffield Div.'s new plant in Houston. He pointed out: The demand for steel is increasing, and he expects the upswing to continue as users stock up in anticipation of a possible steel strike in mid-1962.

Mr. Johnson did not say if, or when, a price hike might come. He did emphasize that an inflationary wage increase of about 40 cents an hour under the present union contract had not been offset by a price increase.

Mr. Johnson and officials of the Sheffield Div. conducted Houston businessmen on a tour of the plant, which is designed to meet Southwestern demands for heat treated, high strength, alloy steel plates. Among the attractions: A new, 160 in., combination slab and plate mill which will go into operation next year.

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Steel Bars . . .

Bar Prices, Page 136

Although hot rolled carbon bars are moving steadily into consumption, demand leaves much to be desired; there's considerable idle rolling capacity. Deliveries run two to three weeks, generally, and not much change is likely until strike-hedge buying starts early next year.

November bookings of cold finished bars fell slightly behind October's (a fairly good month). Producers are wondering why they're not participating more actively in the recovery of demand in the overall steel market.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 137

Demand for reinforcing steel is shrinking seasonally, but the mills are still rolling fair tonnage. Producers supplying Southern fabricators expect to do a good volume business right through the winter. One Midwestern bar mill with five fabricating plants in the South says prospects for active winter demand are encouraging. It expects to roll at least 50 per cent as much tonnage this winter as it ordinarily rolls in the summer months.

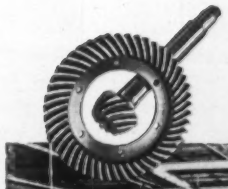
Tubular Goods . . .

Tubular Goods Prices, Page 140

Plans for a $20 million extrusion mill that will produce high test seamless pipe have been approved by the directors of Lone Star Steel Co., Dallas. The pipe will be for deep oil wells, plus nuclear and other critical installations. The mill will also produce other grades of pipe, as well as rounds, squares, and shapes. It will add 300,000 tons annually to the company's tubular goods production capacity.

Seasonal slackening in construction and building is reflected in a slowdown in the movement of butt-weld pipe. Forward ordering is off, and the downturn in buying is likely to continue into the early part of next year.

More activity in the oil fields is expected to stimulate demand for oil country goods. The latest survey of the Hughes Tool Co. shows 1905 rotary oil drilling rigs were operating in the week ended Nov. 20. That compared with 1869 in the preceding week and 1868 in the like



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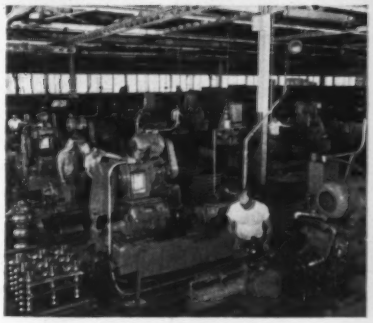

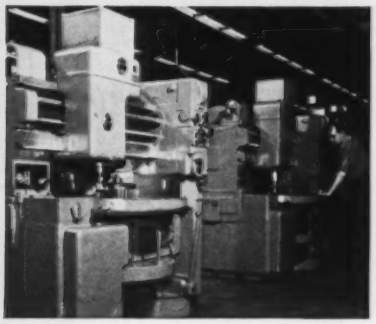

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week of 1960. There were 160 active rigs in Canada during the week, a gain of 13 over the preceding week.

Plates . . .

Plate Prices, Page 136

Several thousand tons of heat treated alloy steel plates will be required by the Defense Operations Div., Detroit, Chrysler Corp. The project: A contract for N-60 tanks costing $16.5 million, placed by the Detroit Ordnance District.

In general, plate demand is slow. A mild spurt in buying of snowplow plate blades is noted in New England. The buying is later than usual, and fabricators are asking for prompt shipments.

Plate mill backlogs are light, with new bookings running heavier in alloy than in carbon plates as the yearend nears.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 137 & 138

Improvement in demand for hot and cold rolled sheets is reported. Consumers appear to be placing considerable tonnage on mill books for January and later delivery. Some mills report a flurry of ordering for December delivery.

Major consumers are expected to start building inventory for strike protection after the turn of the year. The emphasis will probably be on cold rolled sheets because of the likelihood that strong demand from the auto industry will tighten the market.

In some cases, stock building won't be as big as it was prior to the 1959 strike. That's because many users think the Kennedy administration won't permit a long strike. Indicative of consumers' position, a leading electrical equipment producer is reported planning to add a six week supply of sheets to its inventory. In 1959 this firm upped its inventory by three months.

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Prices on Imported Steel: Some Up, Some Down

Prices on imported steel products are mixed. Quotations on several wire items are down, generally 10 to 40 cents per 100 lb. Prices on barbed wire and bright wire are unchanged. Deformed bars are off 10 cents, and steel plates are down 5 cents per 100 lb.

Structural angles, bars, and channels are quoted up 5 to 10 cents, while bar sized angles, furring channels, and hot bands are holding steady.

Importers are beginning to open their books for late March shipments to Great Lakes ports.

Demand for foreign steel is generally off. While merchant bars and structural items are in fair demand, inquiry for most wire products, deformed bars, plates, pipe, and other tubular goods is sluggish.

Western European sellers report some easing in home requirements. Also, as a result of the Berlin Crisis, they are reducing shipments to the Iron Curtain countries to cut the flow of strategic items. West German producers in particular are curtailing shipments. Because of those and other factors, capacity has exceeded demand since September.

Stainless Steel . . .

Stainless Steel Prices, Page 140

With the automotive strikes behind them, producers of stainless steel are riding high again. November bookings may have been the best of the year, sellers report.

Sheets, strip, plates, bars, and wire are all doing better, so it's clear that the automakers aren't

solely responsible for the improvement in demand.

Fansteel Raises Tantalum Prices 10 to 20 Per Cent

Price increases of 10 to 20 per cent on tantalum oxide, tantalum carbide, and tantalum powder have been announced by the Chemical & Metallurgical Div., North Chicago, Ill., Fansteel Metallurgical Corp.

Tantalum oxide was raised $4.50 a pound to $18; tantalum carbide $4 to $22; tantalum powder $3.65 to $31.65. The increases are attributed to higher ore prices, which have doubled within the last year.

Tin Plate . . .

Tin Plate Prices, Page 138

Leading producers of tin cans will increase prices 1¾ to 2 per cent on Jan. 1. American Can Co.'s prices will rise an average of less than 2 per cent, and National Can Co.'s about 1¾ to 2 per cent. Announcement of 1962 price policy is expected to be made shortly by the Continental Can Co.

Demand for tin plate continues to drag. However, the mills are reported holding substantial tonnages in inventory, pending receipt of shipment releases from canmakers.

Distributors . . .

Prices, Page 141

Some steel service centers report business in November exceeded October's on a daily basis. They anticipate a fairly steady rate of demand until the closing week of the year. Undertone of the market pricewise is easy.

Distributors in the Southwest are watching for a spurt in broker speculation in the foreign market. They fear that heavier buying in anticipation of a possible strike at U. S. mills at midyear would damage the service center market in that area.

Wire . . .

Wire Prices, Pages 138 & 139

Bookings by the wire mills are in excess of shipments, partly reflecting consumer efforts to hold down yearend inventories as a tax-saving measure. Consumption is holding up fairly well, which means that many users will need wire tonnage, particularly manufacturers' grade and specialties, early in the first quarter. Buying for first quarter delivery is still far from peak, but it's expected to pick up as December advances.

Atlantic Steel Co., Atlanta, has added upholstery grade, high carbon spring wire to its line of products. Installation of a new patenting line and additional wire drawing equipment, costing $1.5 million, enables the company to furnish spring wire in sizes as fine as 20 gage.

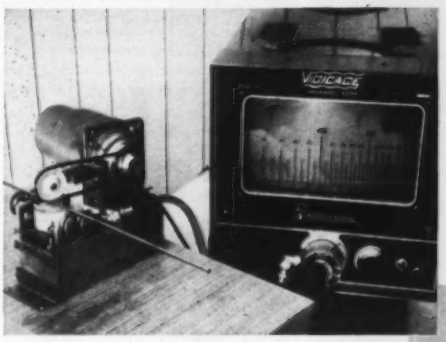
Refractories . . .

Refractories Prices, Page 142

Modernization and expansion of the Bessemer (Ala.) Works of the Refractories Div., H. K. Porter Company Inc., have been completed. Cost: $2.25 million. A new dry press will produce a line of firebrick to meet the requirements of Southern industry. Previously, the Bes-

ANOTHER ULTRASONIC FIRST...

THICKNESS GAGING WITHOUT CONTACT



Tube scanner for VIDIGAGE® thickness gaging without contact.

Thickness gaging by means of the ultrasonic resonance technique can now be accomplished by immersion without contact. This is extremely advantageous because:

- it eliminates transducer wear
- maintains uniform coupling of energy between transducer and work surface (this in turn makes the test more reliable!)
- avoids possible damage to work surface caused by transducer contact
- substantially increases inspection speeds

When the water column is of sufficient length the VIDIGAGE® does not respond to the water resonances. As a result the resonance thickness of the work piece can be detected by itself on the VIDIGAGE screen.
In order to take full advantage of this immersion system, the VIDIGAGE had to be modified. The modified VIDIGAGE then surpassed all expectations, especially in the gaging of small diameter, high accuracy tubing.

This development is another in the long line of BRANSON engineering breakthroughs, which enables industry to solve its problems by means of ultrasonic testing. The next time you have a testing problem call BRANSON and see how fast BRANSON will find the best solution in the shortest possible time.

SINCE 1946 — THE RESPECTED NAME IN ULTRASONICS

BRANSON INSTRUMENTS, INC.

Ultrasonic Test Division
36 Brown House Road, Stamford, Conn.

Close up of sling specially designed for Tex-Tube showing quick-disconnect feature. Traveling choker hooks can be pulled off crescent thimbles once the load of pipes has been lowered. Sling can then be easily removed from under the load with minimum of load damage.

TEX-TUBE'S method of pipe handling improved with CF&I-WICKWIRE SLINGS

Handspliced slings that are used to "choke up" long, heavy loads of pipe have a tendency to unlay as they are pulled out from under the load.

Tex-Tube, in cooperation with CF&I-Wickwire's Houston Sling Shop, came up with an entirely new sling assembly, (pictured above), which provides a quick-disconnect feature without the disadvantages previously encountered.

Art Pitkin, Tex-Tube Purchasing Agent, says: "This sling improved the safety of our pipe-handling operations and reduced the possibilities of marking the pipe. We've been using it successfully for several years."

CF&I-Wickwire can help solve *your* sling problems. For details on our complete line of standard or custom-designed slings and wide range of sling assemblies and fittings, send for your free copies of Folder WR-729 (Wire Rope Slings) and Folder WR-744 (Swing Slings).

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8075

semer Works used only the stiff mud process, which limited applications of the product.

Other phases of the expansion included: The construction of a one-story factory and storage building with 120,000 sq ft of floor space; a tunnel kiln; automatic batching facilities; and a shuttle kiln for special shapes.

Structural Shapes . . .

Structural Shape Prices, Page 136

Fabricated structural steel bookings in October totaled 303,208 tons, down sharply from the previous month's volume, but 23 per cent greater than bookings in the same month of 1960, reports the American Institute of Steel Construction.

Last quarter, 1961, bookings are expected to total at least 900,000 tons. That's down from the preceding quarter, but it will contribute sufficient tonnage to bring the year's total to 4 million tons or more. Bookings in the first ten months of this year were 3,411,346 tons, 11 per cent greater than in the like 1960 period.

Shipments climbed 9 per cent during October. They amounted to 354,480 tons, the third highest monthly total shipped this year, and 1 per cent better than in the corresponding month a year ago. Cumulative shipments for the first ten months of this year were 3,185,988 tons vs. 3,263,565 in the like period last year.

Industry backlogs as of Oct. 31 totaled 2,566,499 tons, of which 1,334,198 tons (52 per cent) were scheduled for fabrication within the four months ending Feb. 28.

Structural fabricators are estimating less tonnage, but considerable work is being planned and will come out for estimates early in 1962.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

17,585 tons, 33 story headquarters building, Tennessee Gas Transmission Co., Houston, to Mosher Steel Co., Houston; W. S. Bellows Construction Co., Houston, is general contractor.

5800 tons, South Expressway viaduct, from south branch of Chicago River to Canal St. near 25th St., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.

2360 tons, bridge superstructure, South branch, Chicago River and South Route Expressway, Chicago, to American Bridge Div., Pittsburgh, U. S. Steel Corp.

2023 tons, two bridges and drainage structures, Wethersfield-Hartford, Conn., to City

Iron Works, Hartford; Onegila & Gervasini, Torrington, Conn., general contractor; also required, 1137 tons of deformed steel bars, 267 tons of steel piles, and 345 tons of steel mat reinforcement.

1775 tons, transmission towers, Melton Hill Dam, Tennessee, Tennessee Valley Authority, Knoxville, Tenn., to American Bridge Div., Pittsburgh, U. S. Steel Corp.

1350 tons, elevated highway, project 80-60-61-22, Chicago, to Allied Structural Steel Co., Chicago.

1125 tons, state highway structures (bridges) FIWE, Queens County, New York, to Standard Structural Steel Co., Hartford, Conn.; Tully & DiNapoli Inc., New York, general contractor.

690 tons, Princeton Club, W. 43rd St., New York, through Iron & Reynolds, general contractor, to Bergen Iron & Engineering Co., Bergen County, N. J.

655 tons, state bridgework, FAGCT 61-3, Queens County, New York, through Tully & DiNapoli Inc., to American Bridge Div., Pittsburgh, U. S. Steel Corp.

580 tons, Chrysler Service Center, 50th St. and 11th Ave., New York, to Lehigh Structural Steel Co., Allentown, Pa.

553 tons, state highway bridge structures, FAC 61-18, Tompkins County, New York, to City Iron Works, Hartford, Conn.; L. G. DeFelice & Sons Co., North Haven, Conn., general contractor.

480 tons, headquarters building, Emhart Mfg. Co., Hartford, Conn., to Standard Structural Steel Co., Hartford; George A. Fuller Co., New York, general contractor.

453 tons, state bridgework, FIC 61-19, Monroe County, New York, through Lane Construction Corp., general contractor, to unnamed fabricator.

450 tons, Belmont filter plant, Philadelphia, through Malan Construction Co., New York, to the Ornamental Iron Works, Philadelphia.

410 tons, addition, Macy's Department Store, Hempstead, Long Island, N. Y., through Skidmore, Owings, Merrill, New York, to Bethlehem Fabricators, Bethlehem, Pa.

290 tons, air traffic control center, McArthur Field, Islip, Long Island, N. Y., through Acme Missile & Construction Co., general contractor, to White Plains Iron Works, Beacon, N. Y.

245 tons, three highway bridges, Springfield, Mass., to City Iron Works, Hartford, Conn.; M. DeMatteo Construction Co., Quincy, Mass., is general contractor.

235 tons, state bridgework, FAWE 61-1, Queens County, New York, through Queens Structures Inc., general contractor, to Goodwin-McDowell Steel Corp., Scranton, Pa.

207 tons, high school, Waterville, Maine, to Augusta Iron Works, Augusta, Maine; Fred L. Merrill Inc., South Portland, Maine, is general contractor; also placed, 50 tons of reinforcing bars to the Bancroft & Martin Rolling Mill Co., South Portland, Maine.

143 tons, state highway bridge, Roxbury, Conn., to Ingalls Iron Works, Birmingham; Mariani Construction Co. Inc., New Haven, Conn., general contractor.

90 tons, Boeing Field hangar for King County, to Leckenby Structural Steel Co., Seattle; general contract to Traverso Construction Co., Seattle, at $512,987.

STRUCTURAL STEEL PENDING

1000 tons (estimated), transport division building, for Boeing Airplane Co., Seattle; general contract to Austin Associates, Seattle.

150 tons, Oregon State underpass; bids to Salem, Oreg., Dec. 6.

REINFORCING BARS . . .

REINFORCING BARS PLACED

900 tons, Parkshore Home for the Aged, Seattle, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Cawdrey & Vemo, Seattle, general contractor.

775 tons, two contracts, U. S. Engineer District, San Francisco, to Oregon Steel Mills, Portland, Oreg.

770 tons, state highway structures, Gardner, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Bayer & Mingolla Construction Co., Worcester, Mass., general contractor.

600 tons, 33 story headquarters building, Tennessee Gas Transmission Co., Houston, to Southwest Steel Products Div., Houston, Armco Steel Corp.

160 tons, Washington State freeway, Seattle section, to Pacific Coast Div., Seattle, Bethlehem Steel Co.; Guy F. Atkinson Co., general contractor.

100 tons, including 60 tons miscellaneous, Seattle office building, to Pacific Coast Div., Seattle, Bethlehem Steel Co.

REINFORCING BARS PENDING

4900 tons, Benedict Canyon channel, Parts 2 and 3, Los Angeles drainage area, Beverly Hills and Los Angeles; bids Feb. 1 to the U. S. Engineer, Los Angeles.

2175 tons, Burbank-Eastern channel, Part 1, Los Angeles drainage area, Glendale, Calif.; bids Mar. 1 to the U. S. Engineer, Los Angeles.

1158 tons, Pike Island locks and dam, Ohio River, Ohio-West Virginia; bids Mar. 2, 1962, U. S. Engineer, Pittsburgh; also required, 105 tons of miscellaneous metal structures.

800 tons, Packwood power project, Lewis County, Wash.; Manson-Osberg Co., Seattle, low at $6,293,764.

355 tons, Idaho State, Bonneville County, six highway structures; general contract to Max A. Boesiger, Mountain Home, Idaho, low at $494,607.

230 tons, Boeing Field hangar, Seattle; general contract to Traverso Construction Co., Seattle.

140 tons, two highway spans, Washington State, Grant County; Max J. Kuney, Spokane, Wash., general contractor at $122,274.

135 tons, also concrete girders, Washington

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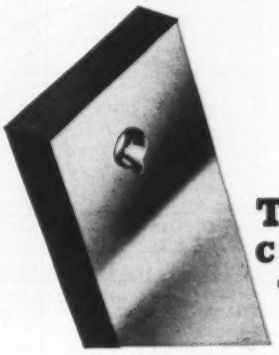

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State approach to Lake Washington Bridge, Seattle; Northwest Construction Co., Seattle, general contractor at $1,387,092.

130 tons, Washington State, two girder bridges, Whatcom County; general contract to Nelson Construction Co. Inc., Ferndale, Wash., low at $161,200.

100 tons, Washington State highway span, Walla Walla County; general contract to C. E. Oneal Inc., Ellensburg, Wash., low at $267,017.

PLATES . . .

PLATES PLACED

615 tons, 15 cone-roof tanks, Cities Service Oil Co., Providence, R. I., to Graver Tank & Mfg. Co., East Chicago, Ill.

322 tons, carbon, Military Industrial Supply Agency, Navy, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

245 tons high tensile, Naval Shipyard, Portsmouth, N. H., to Penn Galvanizing Co. Inc., Philadelphia.

244 tons, carbon, Military Industrial Supply Agency, Navy, Philadelphia, to Columbia-Geneva Steel Div., U. S. Steel Corp., Pittsburgh.

157 tons, alloy grade Hy-80, Naval Shipyard, Portsmouth, N. H., to Lukens Steel Co., Coatesville, Pa.; also, two dished heads to the same fabricator.

100 tons, reservoir pipe outlet, Tacoma, Wash., to American Pipe & Construction Co., Portland, Oreg., at $30,917.

Unstated tonnage, water storage tank, Bureau of Indian Affairs, Hoopa, Calif., to Chicago Bridge & Iron Co., Chicago.

PLATES PENDING

3500 tons, 21,000 ft of 60 and 66 in. water supply line, Lake Forest Park project; bids to Seattle Dec. 13.

Unstated, 500 ft of steel piling; also 25 tons of shapes and reinforcing steel; two highway bridges, Alaska; E. A. Smith and Bockner Co., Anchorage, Alaska, low at $149,658 to the Department of Public Works, Juneau, Alaska.

Steel Output Turns Upward

STEEL producers increased production during the week ended Dec. 2 to an estimated 2,040,000 tons. They anticipate satisfactory business in December and a substantial upturn in demand early in 1962.

• **Youngstown** — The steelmaking rate held fairly steady during the week ended Dec. 2 at about 59 per cent of 1960 capacity. Youngstown Sheet & Tube Co. added an open hearth at its Campbell (Ohio) Works but closed another for repairs. U. S. Steel Corp. took off an open hearth.

The Steel & Tube Div., Timken Roller Bearing Co., returned to operation the 85 ton, No. 9 electric furnace at its Canton (Ohio) Works on Nov. 26. It had been down since March, 1960.

• **Chicago**—Steelmaking operations held steady during the week ended Dec. 2, at 77 per cent of 1960 capacity. Some plants scheduled heavier output, while a few reduced production. Youngstown Sheet & Tube Co. activated the four open hearths in the No. 1 open hearth shop at its Indiana Harbor (Ind.) Works. The No. 1 shop had been idle since 1960.

• **Pittsburgh**—Steel ingot output in the week ended Dec. 2 held at about 70 per cent of 1960 capacity. In spite of the Thanksgiving holiday, production increased slightly in the week ended Nov. 25, totaling about 415,652 tons against 407,585 tons for the preceding week.

• **Buffalo** — Production is holding steady here with the influx of orders described as "pleasing" for this time of year. For the week ended Dec. 2, the rate was about 54 per cent of capacity. Mill executives expect operations to hold around current levels for the balance of this year and then start a gradual upswing.

• **Philadelphia** — Little change was scheduled in Northeastern steel production for the week ended Dec. 2. In the previous week, the AISI index was steady at 105 (based on average actual weekly production for the years 1957-59).

• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta area of the Southern district rose 3 points for the week ended Dec. 2 to an estimated rate of 63 per cent of 1960 capacity.

• **Los Angeles**—Mills restored operating schedules for the week ended Dec. 2 to pre-Thanksgiving levels (78 per cent of 1960 capacity).

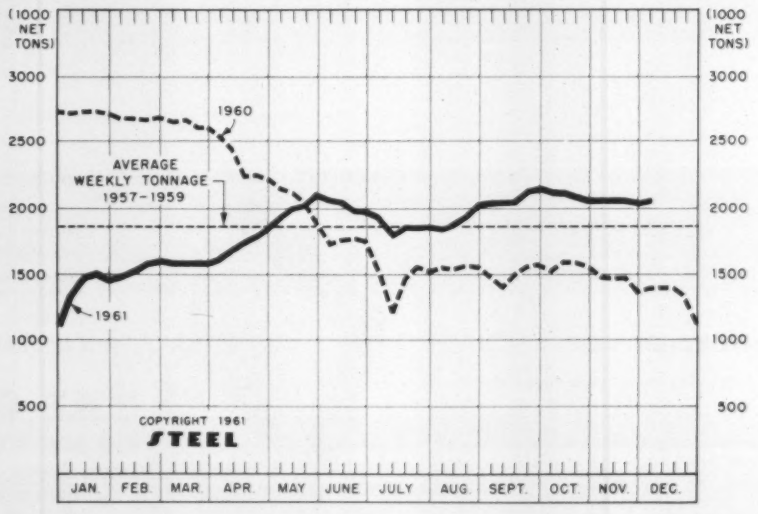
• **Cincinnati**—Production is backing off its recent 90 per cent clip to an estimated rate of 85 per cent of 1960 capacity for the week ended Dec. 2. Two large area producers are reducing production, which had been running close to 100 per cent.

STEEL INGOT PRODUCTION

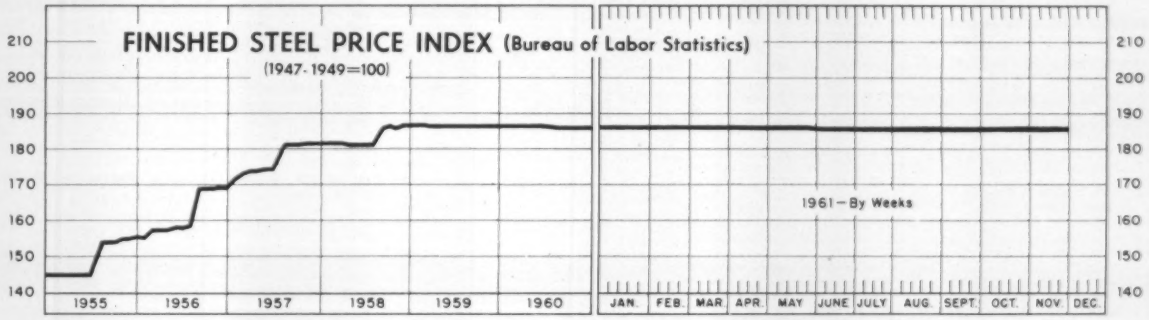
Weeks Ended	Net Tons	Change
Dec. 2	2,040,000*	+ 0.4%
Nov. 25	2,032,000	— 0.2%
Nov. 18	2,037,000	— 0.4%
Totals to Nov. 25		
1961	86,880,000	— 5.4%
1960	91,809,000	

DISTRICTS	Week Ended —Nov. 25— Tons‡	Index†	Week Ended Nov. 18 Index†
Northeastern	280,556	105	105
Buffalo	101,249	104	100
Pittsburgh	415,652	103	101
Youngstown	156,383	92	98
Cleveland	96,299	104	108
Detroit	157,376	150	147
Chicago	422,706	113	113
Cincinnati	104,813	139	139
St. Louis	67,790	129	141
Southern	105,144	97	95
Western	123,928	106	107
Industry	2,032,000	109.1	109.3

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Nov. 28, 1961	Week Ago	Month Ago	Nov. Index	Year Ago
185.4	185.4	185.4	185.4	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 28

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	(N.A.)
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.643
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.225
Strip, C.R., Stainless, 430 (lb)	0.460
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv. Buttweld (100 ft)	23.098
Pipe Line (100 ft)	195.423
Casing, Oil Well, Carbon (100 ft)	193.028
Casing, Oil Well, Alloy (100 ft)	302.645
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, 8d Common (50 lb)	4.715
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Nov. 29 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	225.92
Index in cents per lb	6.713	6.713	6.713	6.713	6.111

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.66
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	33.67	33.00	34.67	28.83	64.67

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 29 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.98	5.35
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.745	5.40
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.20
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.95
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Nov. 29 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.18	66.26
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.68	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	235.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$34.50	$33.50	$33.50	$26.50	$66.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	39.00	34.00	62.50
No. 1 Heavy Melt, Chicago	32.50	31.50	31.50	26.00	65.00
No. 1 Heavy Melt, Valley	33.50	33.50	36.50	26.50	66.50
No. 1 Heavy Melt, Cleve.	30.50	30.50	32.50	23.50	65.00
No. 1 Heavy Melt, Buffalo	27.50	28.50	31.50	23.50	59.50
Rails, Rerolling, Chicago	56.50	57.50	57.50	46.50	89.00
No. 1 Cast, Chicago	39.50	39.50	39.50	36.50	50.50
COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Nov. 29, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 137; footnotes page 139.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 .....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ...119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 .....139.00
Lowellville O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ..5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Buffalo S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2 W14 .6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ...6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ...5.55
Portland,Oreg. O4 ....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2 .5.50
Lackawanna,N.Y. B3 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ...5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes

Aliquippa, Pa. J5 ....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ...8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel

Alabama City,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1 .7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling, Ill. N15 .....7.625
Warren,Ohio R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind. Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
N.Tonawanda S47 .....5.675
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9)N15 ..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5.5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
N.Tonawanda S47 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H. R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ...8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2...5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12...5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14.....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30...11.75*

Alloy

Ambridge,Pa. W18....10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.10
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5....7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2.....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30.....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4...7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30.....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2.....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025

Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ..11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
N.Tonawanda S47 .....9.025
Plymouth,Mich. P5 ....9.225
S.Chicago, Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Williamsport,Pa. S19 ..5.75

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
Seattle A24, B3, N14 ..7.95
Williamsport,Pa. S19 ..7.00
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled)L513.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ...5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14..7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 .....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10(type 1) 9.525
Butler,Pa. A10(type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'br'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ....6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Branford Machine & Mfg.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P10 Precision Strip Mill Div., Solar Steel Corp.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L7 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....5.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10 7.875
NewBritain,Conn. S15 .7.375
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
RiverRouge,Mich. P16..7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 ...7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ...10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.06	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.06	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.06	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.06	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.96	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N2	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
RiverRouge,Mich. P10	9.05	10.50	12.70	....	....
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.96	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	...	18.85	22.95	27.80
Buffalo W12	...	18.85	....	....
Fostoria,O. S1	...	19.05	22.15	....
FranklinPark,Ill. T6	...	19.20	23.30	28.15
Harrison,N.J. C18	...	18.85	22.95	27.80
NewYork W3	...	18.85	22.95	27.80
Palmer,Mass. W12	...	18.85	....	....
Trenton,N.J. R5	...	18.85	22.95	27.80
Worcester,Mass. A7, T6	...	18.85	22.95	27.80
Youngstown S41	...	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....4.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ...7.425*
Riverdale,Ill. A1 .....7.425*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 .....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irwin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt)	0.25 lb Coating
Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.20
Fairless,Pa. U5 .....8.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 .....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 ....8.20
Yorkville,O. W10 .....8.20

ELECTRO. TIN-COATED SHEET (20-27 gage; per 100 lb)

IndianaHarb.,Ind. Y1 ..$7.90

(21-27 gage; per 100 lb)

Aliquippa,Pa. J5 .....$7.90
Niles,O. R2 .....7.90

TIN PLATE, HOT DIPPED COMMON COKE	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65
Stator					
Mansfield,O. E6					8.10
Vandergrift,Pa. U5					8.10
Warren,O. R2 (Locore)					8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ..8.00
N.Tonawanda S47 .....8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00
Buffalo S47 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ....12.90
LosAngeles(2) B3 ....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16 .12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.96
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.075
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.20
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.20
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 .....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 .....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7,J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7 ... $10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10 ... $10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran.C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
S.Chicago,Ill. R2	187**
Sterling,Ill. (7) N15	192

WIRE, Merchant Quality 6 to 8 gage

	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.10	9.85
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
CrawfordsvilleM8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill.,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
S.SanFran. C10	9.95	10.50**
S.Chicago R2	9.00	9.55**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head, Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and setscrews apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter, 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Toe Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.725
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga. 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; Branford Machine & Mfg. Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	**43.50**	**55.70**	67.95	**80.35**	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base—Cold Rolled—10%	Strip, Carbon Base—Cold Rolled—Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.165
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
NorthTonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	78.11	78.61	79.11	....
Rochester, N.Y., deld.	69.87	70.37	70.87	....
Syracuse, N.Y., deld.	71.22	71.72	72.22	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
SouthChicago, Ill. R2	66.00	66.50	66.50	67.00
SouthChicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland A7, R2	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.60%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.45% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.25	10.26	10.06	8.85	9.05	11.70	16.38	8.85	8.70	10.55
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.00	9.28
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9 57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
New York	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9 22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10 40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.05	17.70	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellsville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ¾ in. grains bulk, Luning, Nev., $46; ¾ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$14.75-15.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 82.00-85.00c nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

60% min	$4.15-4.40
65% min	4.50-4.75

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents pel lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Brands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.061 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.40††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, 1 in. x 1 in. x ¼ in.	27.75

(In contract lots of 750 tons price is 22.75c)

Annealed, 99.5% Fe...36.75, ton deld. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 41.30; ton lots	40.30
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90-10.	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4600	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5% below 5 microns	2.32
Molybdenu	3.50-4.10

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. (Source of shipment: Western Continental Europe.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.05	$5.10	$5.00	$4.90	$5.20
Bar Size Angles	5.15	....	5.10	5.00	5.30
Structural Angles	5.15	5.20	5.10	5.00	5.30
I-Beams	5.15	5.20	5.10	5.00	5.30
Channels	5.20	5.25	5.15	5.05	5.35
Plates (basic bessemer)	5.20	5.25	5.10	5.10	5.45
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	24.16	....	24.09	23.81	25.54
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.20	5.25	5.15	5.05	5.35
Hot-Rolled Bands	5.65	5.70	5.60	5.50	5.80
Wire Rods, Thomas No. 5 (Niederrhein)	5.40*	5.50	5.35	5.35	5.60
Wire Rods, O.H., No. 5 (Niederrhein)	5.70*	5.80	5.65	5.65	5.90
Bright Common Wire Nails (‡)	7.05	7.10	7.00	6.90	7.20
(Source of Shipment: Japan)					
Wire, galvanized	8.60	....	8.60	8.60	8.55
Wire, bright	7.60	....	7.60	7.60	7.55
Wire Rods, O.H. No. 5 (Sumitomo)	5.60	....	5.60	5.50	....
Strand, stress relieved (Sumitomo)					
⅜ in. diam, 100 lineal ft	39.90	41.00	39.90	39.90	39.50
7/16 in. diam, 1000 lineal ft	53.50	54.70	53.50	53.50	53.00
Bright common wire nails	7.00	7.30	7.00	7.00	7.00

†Per 82 lb net reel. ‡Per 100 lb keg, 20d and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3% for max 0.03% C, 8.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max), Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%), Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c. f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb. $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 24.00c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5.25% max, Si 3% max, S 0.03% max, 22.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, S 0.03% max, 23.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03% max, 24.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 68-71%: C 0.025% max, 33.00c; C 0.010% max, 33.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.50c. Cr 67-73% C 0.05% max, 33.00c; C 0.75% max, 33.00c; C 2.0% max, 32.5c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 36.50c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 11.50c per lb material; Cr 44-47%, Si 37-39%, C 0.15% max, 12.60c per lb material.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.5c per lb contained Si. Packed, c.l. 17.0c, ton lot 18.45c, less ton 20.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.

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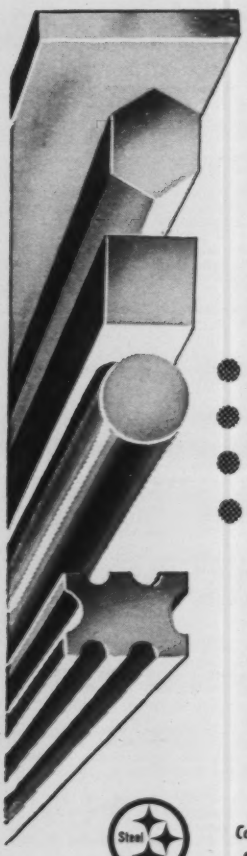

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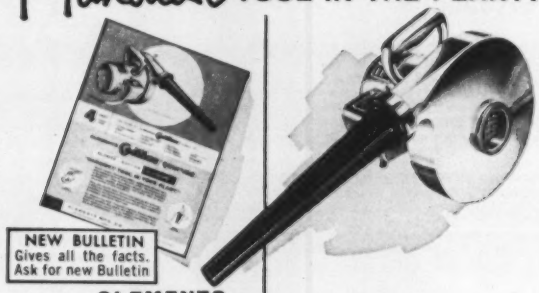

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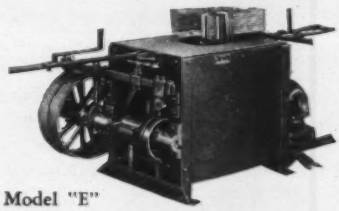

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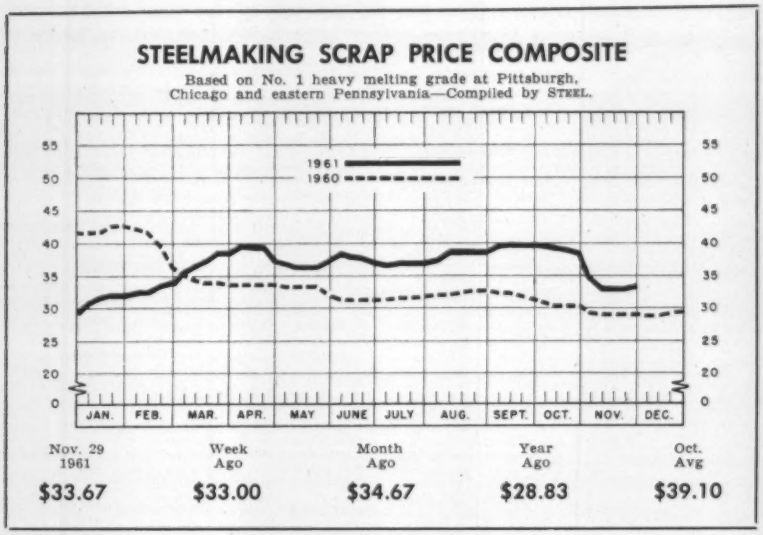

Scrap Index Gets Needed Lift

STEEL's composite on No. 1 heavy melting steel advances 67 cents a ton to $33.67, reversing recent downtrend. Rise reflects higher bids on factory bundles

Scrap Prices, Page 146

● **Chicago**—The district market is up about $1 a ton on the steelmaking grades of scrap based on successful bids for 12,000 tons of No. 1 factory bundles which auto stamping plants will produce for December delivery. The bids of $34.13 and $34.07 f.o.b. tracks, figure out to about $36.60 delivered consumer's plant when the Chicago switching charge of $2.50 per ton is added. The winning bid averaged about $1.50 a ton over those a month ago.

● **Pittsburgh**—Although mill buying is negligible, sellers are optimistic. They think the market will be stronger by midmonth, and they are in a mood to hold out for higher prices. Brokers' bids on the December list of No. 1 factory bundles from the local plant of Fisher Body Div. (General Motors Corp.) were up about $1 a ton. The next mill purchase of No. 1 heavy melting will probably be at $35-$36.

● **Philadelphia**—Prices are easy but largely unchanged. Collections of yard scrap are off due to recent price declines. Domestic demand and export trade are sluggish. Electric furnace bundles are quoted off $1 a ton at $37, delivered. Mixed borings and turnings are also down $1 at $15.

● **New York**—Brokers have reduced their buying prices on No. 2 bundles to $18-$19; unstripped motor blocks are down to $23-$24. Prices on all other grades of scrap are unchanged, with the market dull.

● **Boston**—The ratio of scrap to pig iron in furnace melts in New England is reported to be considerably above the national average. Consumption of scrap in the area during 1961 is expected to total about 375,000 tons vs. 135,000 tons of pig iron. No hot metal (pig iron) is available in New England.

● **Detroit**—The market is up $1 a ton on the steelmaking grades as result of higher bids on industrial bundles at the start of the month. Industrial list tonnages were up 15 to 20 per cent over a month ago, reflecting heavier auto production schedules for December.

● **Cleveland**—Some think mill demand will continue restricted until next quarter. Others anticipate a

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Nov. 29, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 29	$33.67
Nov. 22	33.00
Oct. Avg.	38.10
Nov. 1960	28.83
Nov. 1956	61.83

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	26.00-27.00
No. 1 dealer bundles	*35.00-36.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	*34.00-35.00*
No. 1 factory bundles	*40.00-41.00*
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	39.00-40.00
3 ft and under	36.00-37.00
Heavy turnings	31.00-32.00
Punchings & plate scrap	41.00-42.00
Electric furnace bundles	*41.00-42.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	32.00-33.00
Stove plate	32.00-33.00
Unstripped motor blocks	23.00-24.00
Clean auto cast	33.00-34.00
Drop broken machinery	44.00-45.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Random rails	45.00-46.00
Angles, splice bars	43.00-44.00
Railroad specialties	44.00-45.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	55.00-60.00

CHICAGO

No. 1 hvy melt., indus.	*33.00-34.00*
No. 1 hvy melt., dealer	*31.00-32.00*
No. 2 hvy melting	*28.00-29.00*
No. 1 factory bundles	*36.00-37.00*
No. 1 dealer bundles	*32.00-33.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling, indus.	*33.00-34.00*
No. 1 busheling, dealer	*31.00-32.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*39.00-40.00*
Punchings & plate scrap	*41.00-42.00*

Cast Iron Grades

No. 1 cupola	39.00-40.00
Stove plate	33.00-34.00
Unstripped motor blocks	31.00-32.00
Clean auto cast	44.00-45.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00-36.00*
R.R. malleable	44.00-45.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	42.00-43.00
Axles	*51.00-52.00*
Rails, rerolling	*56.00-57.00*

Stainless Steel Scrap

18-8 bundles, solids	165.00-170.00
18-8 turnings	95.00-100.00
430 bundles & solids	80.00-85.00
430 turnings	45.00-50.00

BUFFALO

No. 1 heavy melting	*27.00-28.00*
No. 2 heavy melting	24.00-25.00
No. 1 bundles	*27.00-28.00*
No. 2 bundles	23.00-24.00
No. 1 busheling	*27.00-28.00*
Shovel turnings	17.00-18.00
Machine shop turnings	12.00-13.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	36.00-37.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cuopla	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	*38.00-39.00*
Rails, 3 ft and under	*44.00-45.00*
Railroad specialties	*37.00-38.00*
Rails, rerolling	60.00-61.00

CLEVELAND

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	22.00-23.00
No. 1 factory bundles	37.00-38.00
No. 1 bundles	31.00-32.00
No. 2 bundles	19.00-20.00
No. 1 busheling	31.00-32.00
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut foundry steel	32.00-33.00
Cut structurals, plate 2 ft and under	36.00-37.00
Low phos. punchings & plate	32.00-33.00
Alloy free, short shovel turnings	20.00-21.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	26.00-27.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	27.00-28.00
Brake shoes	37.00-38.00
Clean auto cast	39.00-40.00
Burnt cast	30.00-31.00
Drop broken machinery	45.00-46.00

Railroad Scrap

R.R. malleable	48.00-49.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	43.00-44.00
Rails, 18 in. and under	48.00-49.00
Cast steel	37.00-38.00
No. 1 railroad cast	44.00-45.00
Railroad specialties	41.00-42.00
Angles, splice bars	40.00-41.00
Rails, rerolling	50.00-51.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	85.00-90.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	23.00-24.00†
No. 1 busheling	34.00-35.00
No. 1 bundles	34.00-35.00
No. 2 bundles	21.00-22.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	35.00-36.00
Electric furnace bundles	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	31.50-32.50
No. 2 heavy melting	25.00-26.00
No. 1 bundles	32.50-33.50
No. 2 bundles	18.00-19.00
No. 1 busheling	31.50-32.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	33.00-34.00
Heavy breakable cast	29.00-30.00
Charging box cast	32.00-33.00
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	20.00-21.00
No. 1 bundles	*30.00-31.00*
No. 2 bundles	21.00-22.00
No. 1 busheling	*27.00-28.00*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	11.00-12.00

Cast Iron Grades

No. 1 cupola	30.00-31.00
Mixed cast	28.00-29.00
Heavy breakable	24.00-25.00
Unstripped motor blocks	20.00-21.00
Clean auto cast	37.00-38.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	70.00-75.00
430 bundles & solids	65.00-70.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	36.00
No. 2 bundles	23.00
No. 1 busheling	36.00
Electric furnace bundles	*37.00*
Mixed borings, turnings	*15.00†*
Shovel turnings	20.00
Machine shop turnings	13.00†
Heavy turnings	24.00†
Structurals & plates	*38.00-40.00*
Couplers, spring, wheels	40.00
Rail crops, 2 ft & under	48.00-49.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	39.00
Drop broken machinery	48.00
Malleable	48.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	27.00-28.00
No. 2 bundles	*18.00-19.00*
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	*23.00-24.00*
Heavy breakable	32.00-33.00

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	70.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	26.00
No. 1 bundles	32.00
No. 2 bundles	21.00
No. 1 busheling	32.00
Machine shop turnings	13.50
Shovel turnings	15.50

Cast Iron Grades

No. 1 cupola	34.00
Charging box cast	33.00
Heavy breakable cast	32.00
Unstripped motor blocks	33.00
Clean auto cast	37.00
Stove plate	30.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	38.00
Rails, rerolling	53.00
Rails, 18 in. and under	43.00
Railroad specialties	38.00
Angles, splice bars	38.00

BIRMINGHAM

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	36.00-37.00
Cast iron borings	9.00-10.00
Machine shop turnings	16.00-17.00
Shovel turnings	18.00-19.00
Bar crops and plate	41.00-42.00
Structurals & plate	40.00-41.00
Electric furnace bundles	36.00-37.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	38.00-39.00
Unstripped motor blocks	29.00-30.00
No. 1 wheels	33.00-34.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, rerolling	46.00-47.00
Rails, 2 ft and under	44.00-45.00
Rails, random lengths	40.00-41.00
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)	
No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	38.00-39.00
No. 2 bundles	24.00-25.00
Machine shop turnings	12.50-13.00
Crushed turnings	18.00-19.00
Low phos. plate & structurals:	
3 ft	41.00-42.00
2 ft and under	45.00-46.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	24.00-25.00
Foundry malleable	28.00-29.00
Unstripped motor blocks	29.00-30.00

Railroad Scrap

R.R. heavy melt (3 ft)	38.00

LOS ANGLES

No. 1 heavy melting	38.00
No. 2 heavy melting	32.00
No. 1 bundles	27.00-29.00
No. 2 bundles	22.00-23.00
No. 2 bundles (export)	23.00-24.00
Machine shop turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Electric furnace scrap	45.00-50.00

Cast Iron Grades

No. 1 cupola	45.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 2 heavy melting	41.00
No. 2 bundles	26.00
Shovel turnings	18.00
Electric furnace	49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable	35.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	33.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	37.00
No. 2 bundles	26.00
Shovel turnings	16.00
Electric furnace	49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	35.00
Stove plate	33.00
Unstripped motor blocks	33.00

SAN FRANCISCO

No. 1 heavy melting	38.00**
No. 2 heavy melting	33.00**
No. 1 bundles	27.00**
No. 2 bundles	23.00**
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	*45.00*
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT

No. 1 heavy melting	27.00
No. 2 hvy melt, 2 ft & under	26.00
No. 1 bundles	28.00
No. 2 bundles	21.50
Mixed steel scrap	19.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	27.00
Unprepared	21.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

pickup in buying before yearend, basing their expectations on an indicated upturn in finished steel demand early in the new year as consumers start to build inventories against a possible midyear steel strike. Currently, the market appears to be a little firmer, particularly on auto list material.

• **Buffalo**—Prices on the primary grades of open hearth scrap are off another $1 a ton in this market. A similar decline is reported on railroad scrap items. No. 1 heavy melting is quoted $27-$28, along with No. 1 bundles and No. 1 busheling.

• **Cincinnati**—Traders are expecting prices to move sidewise pending the outcome of bids on industrial lists. One local mill is expected to enter the market for December tonnage, and another district mill may do likewise before the month closes.

• **St. Louis**—Demand is sluggish, and not much new material is moving either in or out of district yards. Prices are unchanged, but the market undertone appears to be a little firmer, largely due to expectations of a pickup in mill buying in the first quarter next year.

• **Birmingham**—Prices are steady, but brokers report the market continues weak. There is little buying by district steelmakers, and few export inquiries are circulating in the market. No further price changes are expected until around the turn of the year.

• **Houston**—Scrap trading is sluggish, and dealers and brokers are marking time, awaiting a revival in consumer interest. No significant buying is expected until early next year. Old commitments appear to be well covered.

• **Seattle**—Dealers are declining to quote firm prices. As a result, published quotations are more or less nominal. Traders are awaiting word about Japanese requirements. Domestic demand is lagging; buyers are apparently withholding orders until a market trend develops. Collections are slow, and receipts at tidewater are below normal.

• **San Francisco**—Recent weakness

(*Please turn to Page* 151)

Detail showing tong positioning hot stock between Impacter dies

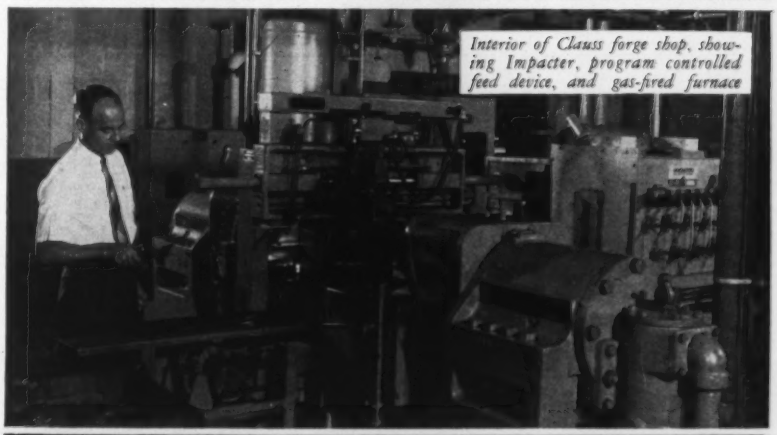
BETTER drop forgings FASTER

automatically... on the Impacter

Clauss Cutlery Company, Fremont, Ohio, is getting **better quality, increased production, reduced scrap,** and **savings in stock** required per forging, for their famous Clauss line of scissors, shears and snips. The Cecomatic Forging Process, incorporating the new **Model "C" Impacter,** is responsible for these and many other outstanding benefits. To learn how, write for a reprint of The Clauss Story and a copy of Bulletin 110-L-1.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PA.

THE FRANKLIN INSTITUTE'S 1961 LONGSTRETH MEDAL "FOR INVENTIONS OF HIGH ORDER" WAS AWARDED THE DESIGNERS OF THE IMPACTER



Interior of Clauss forge shop, showing Impacter, program controlled feed device, and gas-fired furnace

CHAMBERSBURG

Lead Price Up, but Still Shaky

Nonferrous Metal Prices, Pages 150 & 151

THE LEAD PRICE was bumped up 0.25 cent a pound last week (Nov. 28) following a modest improvement in business, but it's still at the lowest level since 1946.

Lead has been the most depressed of the major nonferrous metals all year. Failure of any substantial demand to develop led to two 0.5 cent a pound price drops last month. The first cut, on Nov. 1, which lowered the price to 10.5 cents, failed to increase demand. Business began to pick up a little after another 0.5 cent a pound drop on Nov. 13, but it's still far from good.

• **Trend**—Insiders believe the present price of 10.25 cents a pound may hold over the remainder of the year. The price closely follows sales volume. While consumers are keeping buying plans to themselves, December isn't traditionally a heavy sales month. It's also the time of year many companies whittle inventories for tax purposes.

At the root of lead's troubles is an overabundance of metal on the world market. U. S. consumption has been on a plateau for several years. Consumption outside the U. S. has been on the increase, but so has output. The International Lead & Zinc Study Group estimates that Free World lead stocks will go up about 81,000 tons this year, around 105,000 tons in 1962. At the present price level, profit margins are slim.

• **Other Metals Doing Better**—The year has been better for the other major nonferrous metals. Domestic shipments of slab zinc should exceed 900,000 tons, a four year high.

The U. S. copper industry is also having an excellent year. Through October, deliveries to fabricators totaled 1,194,808 tons. For the year, they should go beyond 1.4 million tons, the best tonnage year since 1956.

Domestic producer copper stocks continue to tumble. They're down to 76,785 tons.

Outside the U. S., copper deliveries to consumers will come close to matching last year's record. For the entire Free World, 1961 shipments should set an all-time high.

Aluminum volume is up. One indication: The Aluminum Association says shipments of sheets and plates over the first nine months totaled 552,594 tons compared with 522,318 tons in the same period last year. Foil shipments for the first nine months totaled 91,397 tons vs. 85,411 tons in the like 1960 period.

Primary production will fall to around 1,890,000 tons from the record 2,014,000 tons of 1960.

MILL PRODUCTS	Current Inventories (Percentage)					1st Quarter Forecast (Percentage)		
	Under 10 Days	10-30 Days	30-60 Days	60-90 Days	3-6 Months	Lower	Same	Higher
Copper, Copper Base Alloys	5	35	36	20	4	6	79	15
Aluminum	15	22	40	16	7	8	77	14

Users to Stand Pat on Stocks

Most consumers of copper and aluminum products are satisfied with the level of their metal inventories. STEEL's nationwide quarterly survey of purchasing agents reveals that over the next three months only a few companies will either expand or pare stocks (see table above).

The trend to replenish inventories which began in the second quarter will continue, but at a reduced level. Copper stocks may rise a little faster in the next three months than in the last three. A few companies will continue to build aluminum stocks but not to the degree they have in the last few months. Some users of both metals will keep cutting back on what they consider excessive inventories. Indications are that zinc alloy stocks will remain stable.

Selenium Price Cut

The price of selenium has been cut for the second time this year, reflecting weakened demand. Producers quote $5.75 a pound. The old price: $6.50 a pound. This year, U. S. production is exceeding shipments by a substantial amount, a reversal of the pattern of the last few years.

HIGH QUALITY WIRE RODS AND WIRE PRODUCTS OF YAWATA EXCELLENCE

Users of Yawata's wire rods and wire products everywhere with critical eyes see quality beyond price. Yawata's high quality wire rods, made of basic open hearth steel, in various grades as specified in AISI and SAE, and in gauges as provided in Japan Industrial Standards and others, are outstandingly uniform in clean surface finish, sizes, roundness, tempers, and analyses. They are shipped abroad in coil length weighing as much as 705.5 lbs. Under the watchful eyes of Yawata's experienced and skilled engineers and workers, broad lines of quality wire products, including bright wires, annealed wires, baling wires, coat hanger wires, galvanized wires, barbed wires, regular nails, cement-coated nails, galvanized nails, roofing nails, screw nails, staples, duplex nails, made from mild and hard steel wire rods, emerge from the modern manufacturing lines destined for the world market, following the severest of tests to doubly assure Yawata excellence in quality.

YAWATA IRON & STEEL CO., LTD.

Head Office: No.1, 1-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan
European Office: Immerman Strasse 15, Dusseldorf, West Germany Tel: 1-0463
American Office: Room 2009, Seagram Building, 375 Park Ave., New York 22, N.Y. U.S.A. Tel: MUrray Hill 8-3327

TRADE MARK

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.
Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.
Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.
Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.
Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.
Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.
Bismuth: $2.25 per lb, ton lots.
Cadmium: Sticks and bars, $1.70 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.
Columbium: Powder, $40 per lb and up nom.
Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.
Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.
Gold: U. S. Treasury, $35 per oz.
Indium: 99.9%, $2.25 per troy oz.
Iridium: $70-75 per troy oz nom.
Lead: Common, 10.05; chemical, 10.15; corroding, 10.15; St. Louis, New York basis, add 0.20.
Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.
Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.
Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.
Mercury: Open market, spot, New York, $188-191 per 76 lb flask.
Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.
Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 77.50.
Osmium: $70-90 per troy oz nom.
Palladium: $24-26 per troy oz.
Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.
Rhodium: $137-140 per troy oz.
Ruthenium: $55-60 per troy oz.
Selenium: $5.75 per lb, commercial grade.
Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $5.25 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot, 122.125; prompt, 121.875.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.
Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.98, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.98, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $15.75 per cwt; pipe, full coils, $15.75 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.60
0.751-0.250	6-144	72-240	44.50-49.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	55.70	....	58.30
1.750	53.00	55.70	58.30	58.30
1.875	53.00	55.70	....	58.30
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2 500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

* Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes, 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in. 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.25-23.75; No. 2 heavy copper and wire, 21.50-22.00; light copper, 18.75-19.25; No. 1 composition red brass, 20.50-21.00; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

(Copper or Copper Alloy No.)	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	SCRAP ALLOWANCES d (Based on copper at 31.00c) Clean Heavy	Rod Ends	Clean Turnings
Copper (110)	56.13b	50.36–51.36	....	57.32	27.00	27.00	26.25
Yellow Brass (268, 270)	49.27	35.77c	49.56	53.43	20.375	19.50c	19.50c
Low Brass, 80% (240)	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85% (230)	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze (675)	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal (365)	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass (464)	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Brass (651)	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10% (745)	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb. f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.50-20.00; new brass clippings, 15.00-15.50; light brass, 12.00-12.50; heavy yellow brass, 13.00-13.50; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.00-17.50; brass pipe, 15.00-15.50.

Lead: Soft scrap lead, 6.75-7.00; battery plates, 2.50-2.75; linotype and stereotype, 8.00-8.50; eelctrotype, 7.50-7.75; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.25; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.00-8.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 10.00-10.50; segregated high copper clips, 9.00-9.50; mixed low copper clips, 9.50-10.00; mixed high copper clips, 9.00-9.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.50; mixed low copper clips, 12.00-13.00; mixed high copper clips, 11.00-12.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.75; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.25; mixed low copper clips, 12.50; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.75; light copper, 22.50; refinery brass (60% copper) dry copper content, 23.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.75; light copper, 22.50; No. 1 composition borings, 23.50; No. 1 composition solids, 24.00; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 20.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 140.50; 200-499 lb, 139.00; 500-999 lb, 138.50; 1000 lb or more, 138.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.85, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chrome Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.5; 10,000-20,000 lb, 30.00; 20,-000 lb or more, 29.50.

Copper Cynide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 500-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 89.20; 100-600 lb, 79.50; 700-1900 lb, 76.80; 2000-9990 lb, 74.90; 10,000 lb or more, 73.60.

Stannous Chloride (Anhydrous): 100 lb, 148.40; 400 lb, 138.40; 800-19,000 lb, 117.10; 20,000 lb or more, 112.90.

Stannous Sulphate: Less than 50 lb, 155.70; 50 lb, 125.70; 100-1900 lb, 123.70; 2000 lb or more, 121.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 147*)

in steel scrap prices has spread to the cast iron grades. No. 1 cupola cast is quoted a shade lower at $45 a ton.

• **Los Angeles**—The market continues soft, and a price drop of $2 to $3 a ton is predicted for this month. While an across-the-board decrease is predicted, some traders say supplies of No. 1 heavy melting steel are short enough to sustain the price on that grade.

Scrap Consumption Shows Sharp Gain Over Year Ago

Consumption of ferrous scrap in September was little changed from that in the preceding month, but it was 20 per cent greater than it was in the comparable month of 1960, reports the U. S. Bureau of Mines. Pig iron consumption in the month was the largest since May, 1960.

The total furnace charge of scrap and pig iron (10,432,000 gross tons) was 3 per cent higher than it was in the preceding month. It consisted of 48 per cent scrap (4,981,000 tons) and 52 per cent pig iron (5,-451,000 tons). That compared with 49 per cent scrap (4,982,218 tons) and 51 per cent pig iron (5,246,254 tons) in August.

Consumers' stocks of scrap on Sept. 30 were 7,749,000 gross tons, a slight increase over the 7,650,496 tons held on Aug. 31. Stocks of pig iron at the end of September were 2,644,000 tons vs. 2,718,648 at the end of August.

Home scrap produced during September totaled 3,137,000 tons, slightly more than during August. Purchased scrap received by consumers amounted to 1,943,000 tons, a small increase over the August total. Of the purchased material, 86 per cent came from dealers and 14 per cent from other sources.

Independent Yard Dealers Meet in New York Dec. 10

The eighth annual convention of the National Federation of Independent Scrap Yard Dealers Inc. will be held Dec. 10 at the Barbizon-Plaza Hotel, New York. The meeting will be addressed by Ray Zimmerman, Richards Shear Co., Seattle, on "Machinery, Mechanization and Labor." Other speakers will be: William Petrella, La Guardia & Petrella, New York, who will discuss scrap yard economics; and Harry Wische, Newark Iron & Metal Co. Inc., Union, N. J., who will discuss the future of the scrap industry.

Iron Ore . . .

Iron Ore Prices, Page 142

The Great Lakes ore shipping season is just about at an end. Large operating companies began laying up their vessels in the closing week of November. Pittsburgh Steamship Div., Cleveland, U. S. Steel Corp., expected to have its fleet in winter ports shortly after the start of December. The fleet's last ore loading for the 1961 season was on Nov. 24 at Two Harbors, Minn.

Increased downbound and less upbound cargo traffic moving through the St. Lawrence Seaway in the 1961 season are reflected in preliminary toll traffic statistics for

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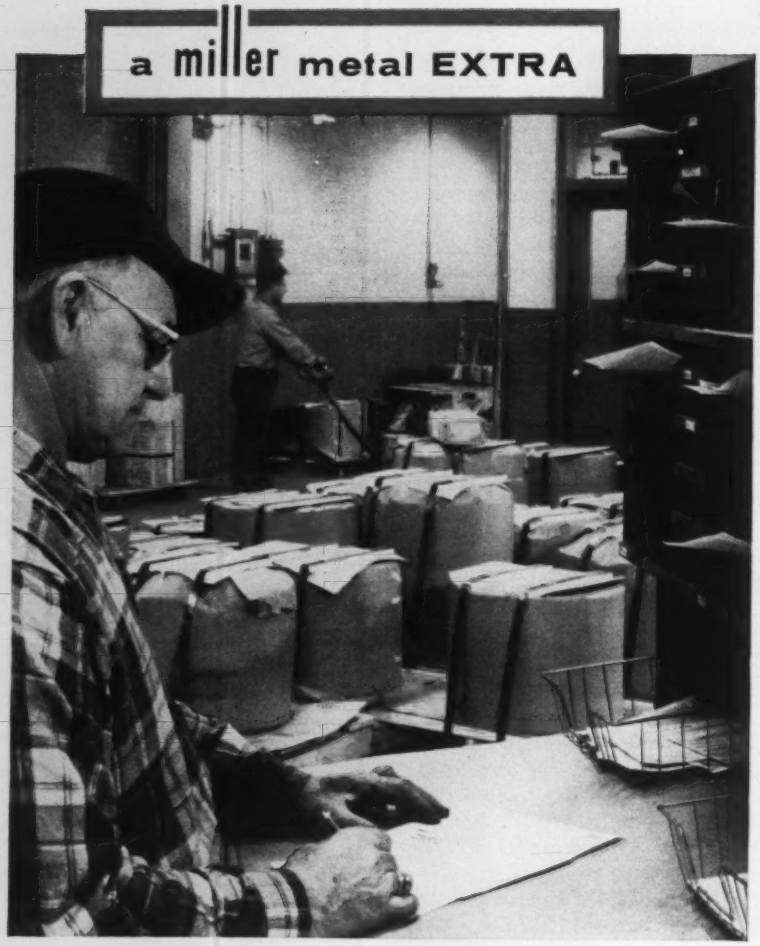

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the season through October.

Operations will be resumed Dec. 4 at Republic Steel Corp.'s Lyon Mountain (N. Y.) ore mine. Improved demand for pig iron produced at the company's Troy, N. Y., blast furnace and the need to replenish pig iron stocks are reflected in the mine opening. The mine has been shut down since Aug. 31.

Pig Iron . . .

Pig Iron Prices, Page 141

Merchant pig iron is moving at a steady rate. Indications are that December shipments will be close to those of October and November.

Consumers are riding along with low stocks and want fast delivery when they place orders. They have no difficulty in getting this service because supplies remain ample.

Inland Steel Co. relighted its No. 1 blast furnace at Indiana Harbor (Ind.) Works which had been blown out June 27 for relining. Youngstown Sheet & Tube Co. has relighted its No. 2 blast furnace. Its three stacks at Indiana Harbor are now in operation. Of the district's 43 blast furnaces, 29 are active, the highest total since July when 28 were in blast.

Freight Car Buying Up Slightly in November

Indications are that freight car buying in November slightly topped the 2086 units placed in October. Figures released by the American Railway Car Institute and the Association of American Railroads show the October total compared with 3143 cars in September.

October deliveries amounted to 1907 units vs. 2700 in September—and 4632 in October last year. Of the cars delivered in October, 1204 were built in contract carshops and 703 in railroad shops.

Cars on order and undelivered as of Nov. 1 amounted to 6731 in railroad shops and 3566 in commercial shops, a total of 10,297. That compares with 10,133 on order Oct. 1—and 22,900 on Nov. 1, 1960.

Backlogs as of Nov. 1 included 3104 hopper cars, 2751 boxcars, 1204 flatcars, 1034 refrigerator cars, 982 tank cars, 798 covered hopper cars, and 264 gondolas.

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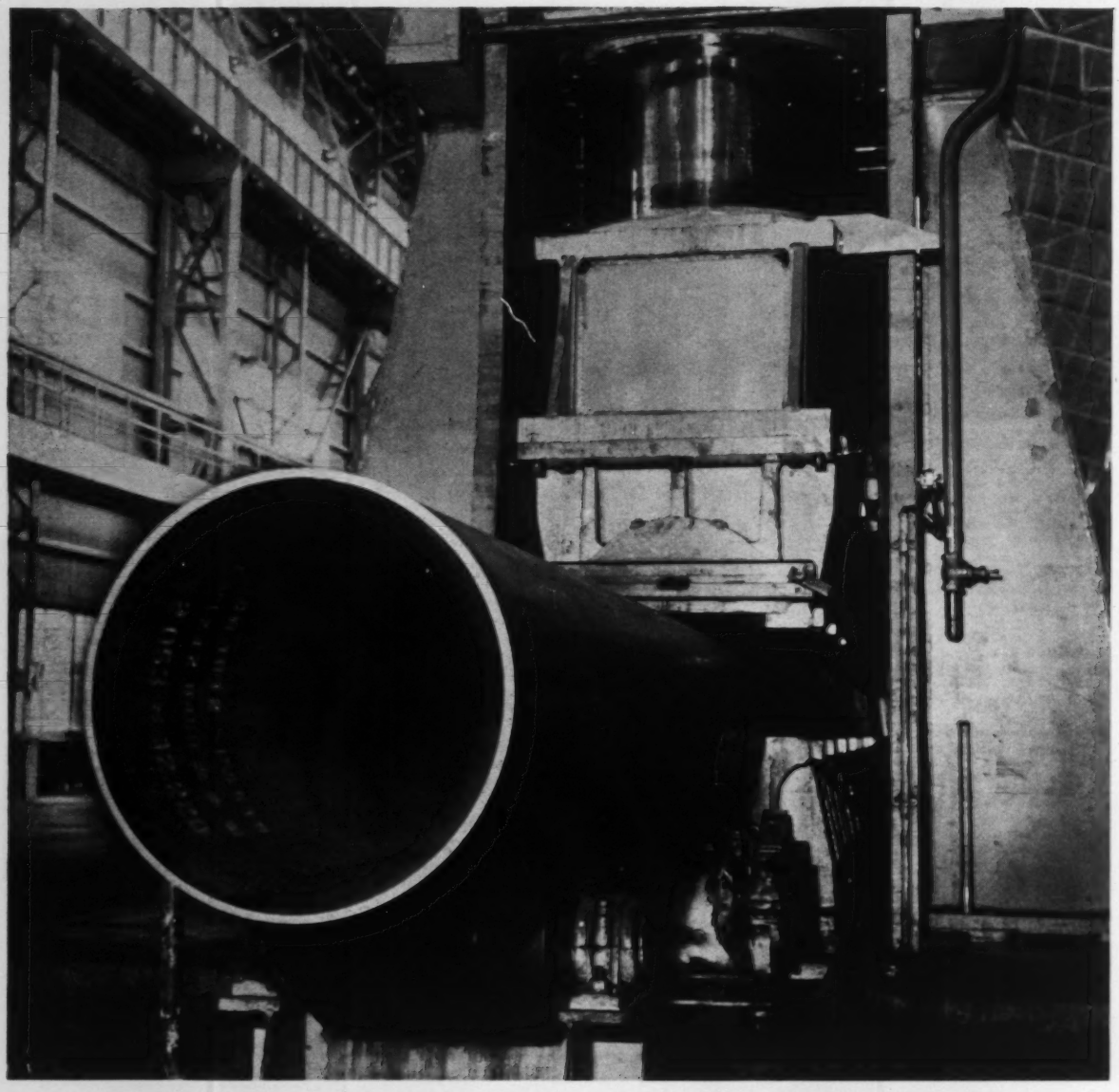

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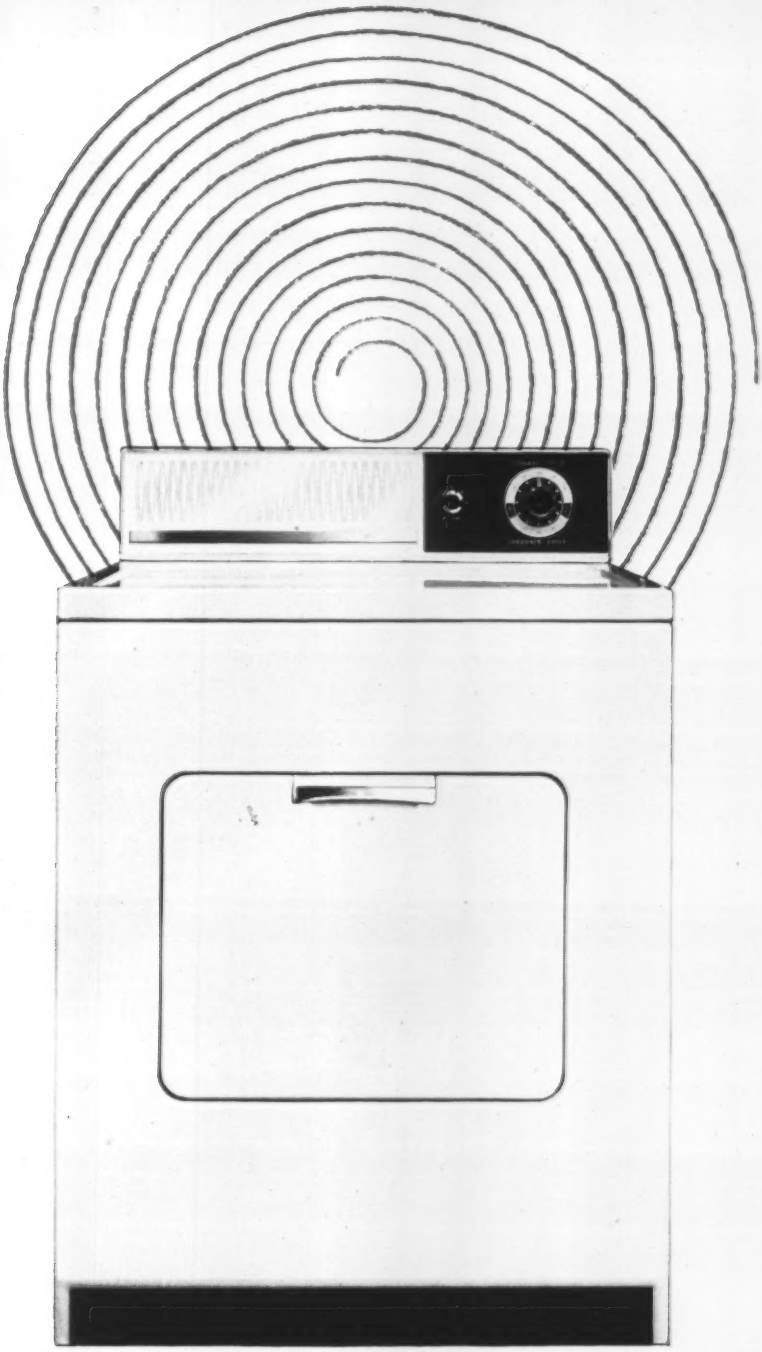

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